The RUBBER AGE

December, 1944

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R. T. VANDERBILT CO. INC. AMERICAN PRODUCTS

ETHYL TUADS

Ethyl Tuads offers these desirable features:

It is completely dustless in handling by compound and mill room workers.

•

It mills into rubber very quickly and easily.

•

It melts in the mix at factory processing temperatures insuring perfect dispersion.

•

It is a powerful accelerator and vulcanizing agent yet not scorchy in processing.

•

It is readily available.

•

Dustless · Perfect Dispersion · Available

R. T. VANDERBILT Co., Inc.
230 Park Avenue, New York 17, N. Y.

R. T. VANDERBILT CO. INC. AMERICAN PRODUCTS

Newsletter No. 12
DECEMBER, 1944

Published by Rubber Chemicals Division of DUPONT

MORE NEOPRENE IS AVAILABLE—*NOW*

AN INCREASE in production capacity coupled with a levelling off of demand for neoprene in military products is reflected in the recent removal of many restrictions on its use by the War Production Board. Neoprene can now be used for any item permitted by the current Rubber Order (R-1), and for many other products whose manufacture will not divert manpower from military needs.

MONTHLY CONSUMPTION of neoprene is well over 9,000,000 lbs. Production capacity at Louisville is

sufficient to take care of current demands and any unexpected uses for war products and in addition many civilian products now prohibited because of the shortage of manpower and processing equipment. Moreover, plant expansion is well under way so that by early 1945, production capacity at Louisville and Deepwater, N. J. will be 14,000,000 lbs. per month—about 10 times that manufactured in 1941. Only a totally unexpected emergency —one which would affect all elastomers—can create a shortage. It is now safe to say: "There's plenty of neoprene" and rubber manufacturers can plan their present and future production programs on the basis of an assured supply.

EARLY RESTRICTIONS placed on the use of neoprene were a military necessity. It had to be conserved for the most important uses. The properties which made neoprene an important and vital material for war products, can now be utilized for the creation of quality rubber products for all uses. Now rubber manufacturers and consumers are free to give every consideration to the widespread use of neoprene. It is expected that they will, since many new performance requirements will be demanded for the products of the future.

ABOUT NEOPRENE, ITSELF—
It is the most versatile synthetic rubber. When a product calls for a high quality resilient material, a lot of time and effort can be saved by using neoprene *first.* It is the standard against which to compare *all* resilient materials, because it's an all-purpose rubber. For many applications, it is the best material though not always the cheapest. *It pays to try neoprene first.*

NEOPRENE TYPES GN and GN-A are no longer being supplied from the Carney's Point Plant, but their counterparts, GRM and GRM-10, are available for prompt shipment from the Rubber Reserve Plant at Louisville, Ky.

NEOPRENE TYPES E, M, CG, FR, KNR, and Neoprene Latices Types 571, 572 and 60 are supplied from the DuPont Plant at Carney's Point, N. J.

BACK THE ATTACK WITH WAR BONDS

DUPONT

RUBBER CHEMICALS DIVISION

BETTER THINGS FOR BETTER LIVING . . . *Through Chemistry*

THE RUBBER AGE, published monthly by The Palmerton Publishing Co., Inc., Printing Office, East Stroudsburg, Pa. Editorial and Advertising Offices at 250 West 57th Street, New York 19, N. Y. Entered as second class matter October 20, 1933, at the Post Office at East Stroudsburg, Pa., under the Act of March 3, 1879. Subscription in United States, $3.00 a year; Canada, $3.50; Foreign, $4.00. December, 1944, Vol. 56, No. 3.

Answer: Because you get a LOT more!*

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*question: why should you pay even a *little* more for Hycar?

COMPARING the price per pound of Hycar and other synthetic rubbers is like comparing the price per pound of hot-house strawberries with rutabagas. Comparative prices mean little if the materials aren't the same. And there is no other group of synthetic rubbers exactly like Hycar.

Hycar's superiority naturally commands a premium price. Yet after considering the compounding and processing economies inherent in Hycar, *this premium material gives you more for your money than less desirable synthetic rubbers.* And better finished products that in turn command premium prices are the result.

You get a lot more when you pay a *little* more for Hycar!

Take a look at some of the advantages of Hycar as compared to other oil-resistant types:

- *. . . Better storage stability in crude and compounded states—won't set up—no stickiness*
- *. . . Dependable uniformity of crude material which eliminates processing changes and compound revisions*
- *. . . Lower specific gravity means 25% more volume in finished product*
- *. . . Better oil and gas resistance*
- *. . . Can be blended with GR-S and maintain adequate oil resisting characteristics*
- *. . . Will take higher pigment loadings without undue sacrifice of quality*
- *. . . Better extrusion characteristics—maintains shape during processing—won't collapse*
- *. . . A variety of combinations of properties not otherwise obtainable*
- *. . . Excellent performance in severest types of service has been proved throughout all industry*

Hycar's Technical Service Staff is at your service, ready to help you with your individual problems. *Hycar Chemical Company, Akron 8, Ohio.*

Hycar

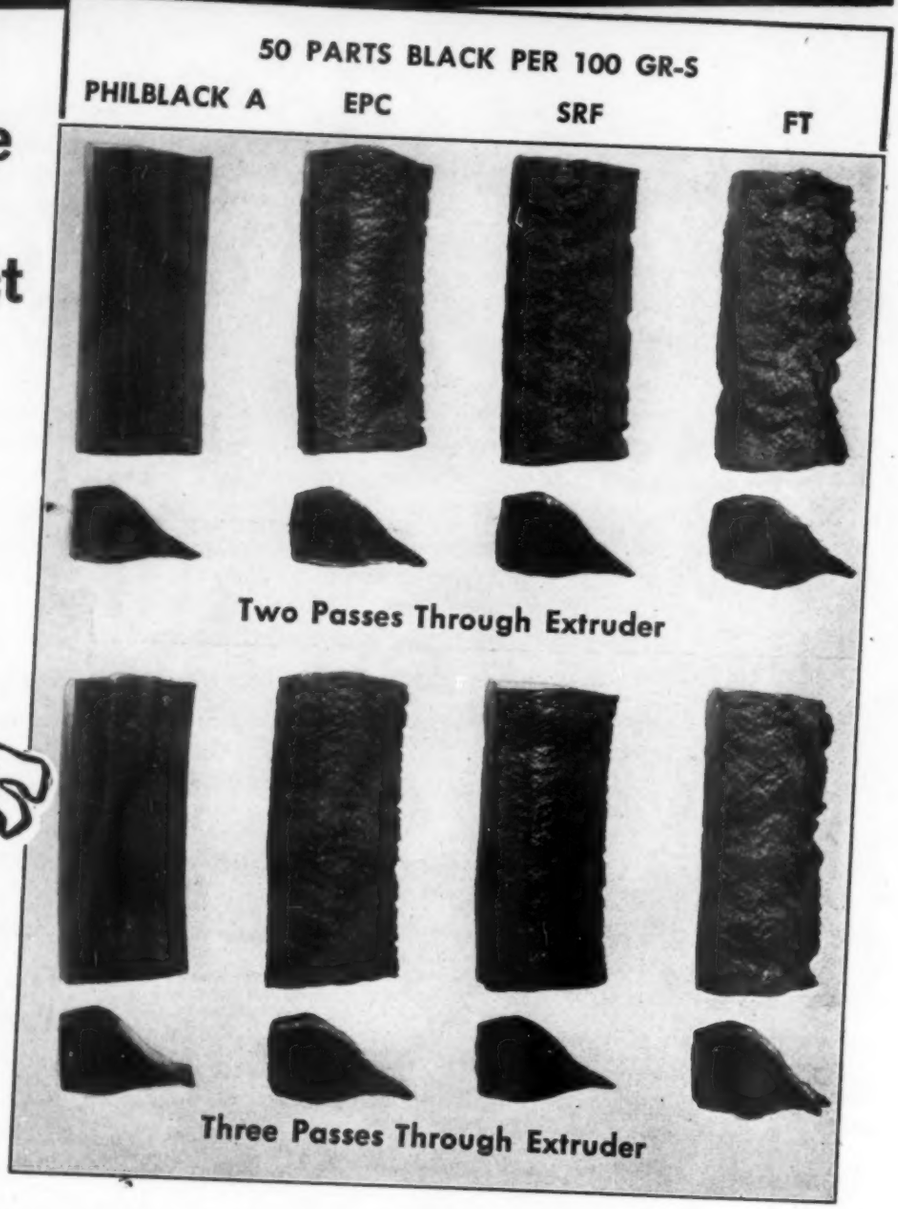
Reg. U. S. Pat. Off.

LARGEST PRIVATE PRODUCER OF BUTADIENE TYPE

Synthetic Rubber

PHILBLACK A

Saves Processing Time Improves Finished Product



The shorter time required for processing GR-S with PHILBLACK A, as compared with three other types of black, is clearly shown in the above illustration taken from the PHILBLACK A booklet. The PHILBLACK A stock after two passes through the extruder has become extremely smooth, while the other stocks will require additional breakdown to obtain the same degree of smoothness. Many other comparisons and interesting facts are shown in the PHILBLACK A booklet.

WRITE FOR YOUR FREE COPY TODAY

PHILLIPS PETROLEUM COMPANY

Philblack Division, First Central Tower, Akron, Ohio

With Geon it's the *combination* of properties that counts

THAT flexible plastic film in the picture is 4/1000 of an inch thick. Yet it remains unaffected even by nitric acid. That's because it's made from one of the GEONS, a new group of polyvinyl materials whose long list of unusual properties includes resistance to acids and other corrosive chemicals.

But one property is important chiefly in its relationship to other properties. That's why we say, with GEON it's the *combination* of properties that counts. Examine this list. Try to imagine the thousands of combinations that can be obtained from it.

Products of GEON can be made resistant to water, oil, grease, acids, alkalies, sunlight, cold, heat, aging, air, ozone, abrasion, flame, mildew, creasing and many others. They may be permanently flexible, waterproof, light weight, odorless, tasteless. They can be made in a wide range of colors. And they can be heat sealed.

GEON can be extruded, pressure or injection molded. It can be calendered or cast into sheet or film. It may be used as a coating for textiles and papers of all kinds. Its almost limitless applications extend into the plastics, packaging, textile, food, rubber, paper, clothing, shoe and many other fields. Probably many of its most important applications have yet to be developed.

Right now all the GEONS are subject to allocation by the War Production Board. Limited quantities may be had for experiment. And our development staff and laboratory facilities are available to help you work out any special problem or applications. For more complete information write Department K-7, Chemical Division, The B. F. Goodrich Company, 324 Rose Building, E. Ninth and Prospect, Cleveland 15, Ohio.

Geon
Polyvinyl Materials

CHEMICAL DIVISION
THE B. F. GOODRICH COMPANY
ROSE BUILDING, E. NINTH & PROSPECT, CLEVELAND 15, OHIO

Chemical Uniformity contributes to the wonders of NEOPRENE

It looks like rubber, but it isn't. It has many characteristics of rubber, but effectively resists oil, sunlight, heat and many chemicals. Commercially it's called neoprene.

Neoprene's pre-war uses were numerous in manufacturing parts for the industrial field. Since Pearl Harbor, neoprene uses in fabrication have been widely increased. Because of the unique properties of neoprene it has been given many war jobs, and is doing them well.

Neoprene is mixed with compounding ingredients and vulcanized to form the final product. The successful use of neoprene for peace and war-time projects depends to a great extent upon the uniformity of the chemicals used in compounding and processing it.

One of these is Baker's Magnesium Oxide, Neoprene Grade, made and packaged especially for users of this material. Here, as in many other industries where chemical exactness is paramount, Baker is an important supplier of chemicals to exacting specifications. Baker's chemicals—purity by the ton—have been made for a large number of the nation's leading concerns for the manufacture or processing of numerous products. The roll call of Baker's customers reads like Who's Who in America.

If you have special chemical requirements involving purity to the decimal for war production products or for the anticipated post-war reconversion program, we invite you to discuss your needs in confidence with Baker.

J. T. Baker Chemical Co., ***Executive Offices and Plant:*** **Phillipsburg, New Jersey.** ***Branch Offices:*** **New York, Philadelphia, and Chicago.**

Baker's Chemicals

C. P. ANALYZED • FINE • INDUSTRIAL

Have you entered the Chicago Rubber Group Contest?

Yes . . .

THERE IS A NAME FOR IT

That name is

MULTI-PLAST

IT IS MADE by the originators and leaders in the field of sulfur-reactive plasticizers.

IT IS MADE especially for you as a primary product — *not* as a by-product.

IT IS MADE by large-scale production methods that bring it into the low-priced field.

IT IS MADE under rigid supervision to insure uniformly high quality.

MULTI-PLAST is brought to you by our technical representatives, experienced men with a know-how in rubber compounding. They can give you helpful suggestions on the use of MULTI-PLAST for low-cost high-quality compounding.

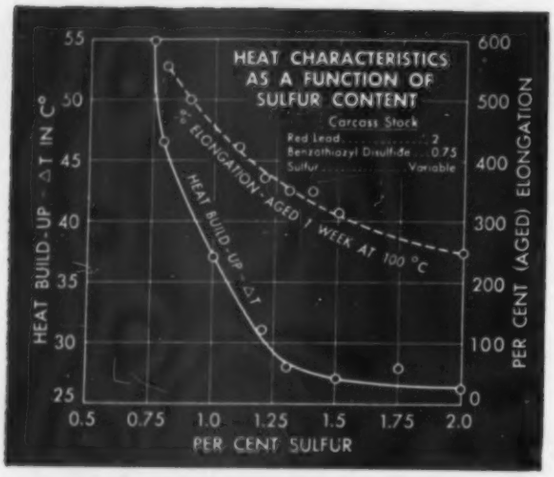
WILCHEM PRODUCTS: NAFTOLEN • MULTI-PLAST • ECONO-PLAST • NAFTEX
NAFTOLEN EMULSION • WILMEX • WILCOR RECLAIMING OILS • POLY-TINT

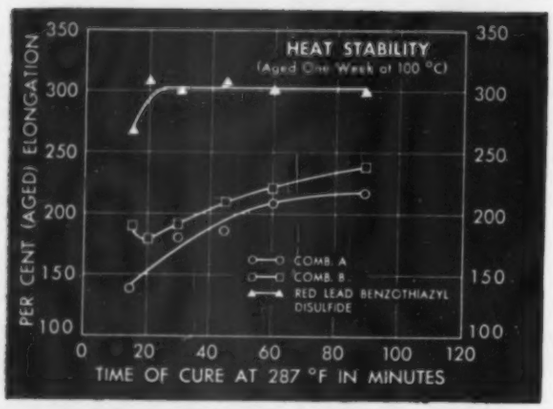
The booklet, "TENSILE STRENGTH TABLE", designed as an aid in your physical testing laboratory is available. Write for your copy.

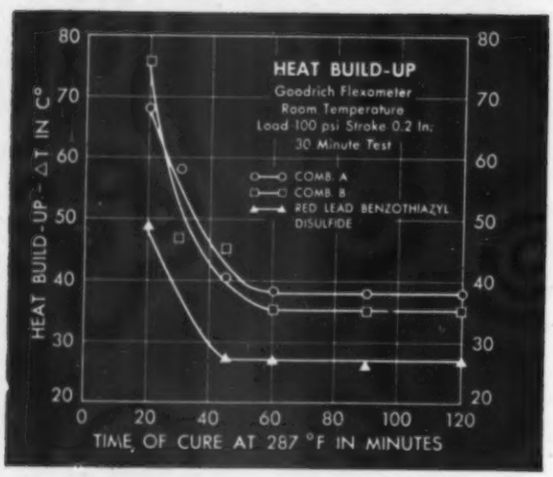
WILMINGTON

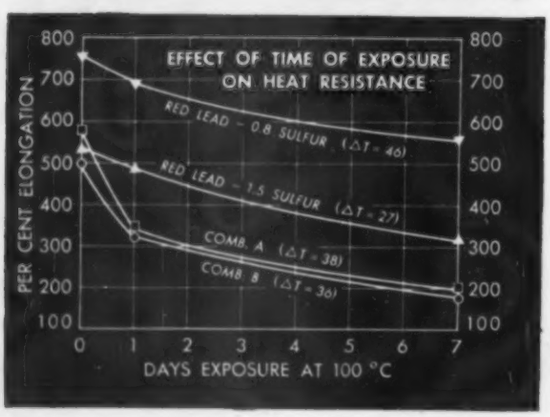
CHEMICAL CORPORATION

10 EAST 40TH STREET • NEW YORK 16, N. Y.


HEAT CHARACTERISTICS AS A FUNCTION OF SULFUR CONTENT
Carcass Stock
Red Lead 2
Benzothiazyl Disulfide 0.75
Sulfur ..... Variable
% ELONGATION - AGED 1 WEEK AT 100 °C
HEAT BUILD-UP - ΔT
HEAT BUILD-UP - ΔT IN C°
PER CENT (AGED) ELONGATION
PER CENT SULFUR


HEAT STABILITY
(Aged One Week at 100 °C)
COMB. A
COMB. B
RED LEAD BENZOTHIAZYL DISULFIDE
PER CENT (AGED) ELONGATION
TIME OF CURE AT 287 °F IN MINUTES




EFFECT OF TIME OF EXPOSURE ON HEAT RESISTANCE
RED LEAD - 0.8 SULFUR (ΔT - 46)
RED LEAD - 1.5 SULFUR (ΔT - 27)
COMB. A (ΔT - 38)
COMB. B (ΔT - 30)
PER CENT ELONGATION
DAYS EXPOSURE AT 100 °C

Heat build-up and heat stability . . . both improve when you compound GR-S with RED LEAD

Have you had difficulty making your GR-S carcass stocks both heat resistant and cool running?

If so, try the right combination of red lead, benzothiazyl disulfide and sulfur.

Its acceleration is sufficiently active and efficient to provide—concurrently—heat stability and low heat build-up.

Note the following table and the accompanying charts.

FORMULA

GR-S (Institute)	100
S.R.F. Black	30
Zinc Oxide	3.0
Paraflux	7.5
No. 2 R.M. Red Lead	2.0
Benzothiazyl Disulfide	0.75
Sulfur	1.5

Physical Properties

T/287° F.	Tensile Strength	% Elong.	T-300	Shore	ΔT° in C°
15	1520	860	315	....	....
20	1630	780	390	46	49
30	1450	630	520	47	47
45	1330	530	570	47	27.5
60	1210	480	520	47	27
90	1130	500	590	47	26
120	1100	500	610	47	28

	Aged One Week at 100° C.			Aged 48 Hours at 100° C.	
T/287° F.	Tensile Strength	% Elong.	T-300	Shore	ΔT° in C°
15	910	270	.....	....	....
20	1080	320	1000	54	30.5
30	990	300	990	54	30.5
45	1050	310	1000	53	29.5
60	1130	300	1090	53	26
90	1090	300	1090	53	25
120	1160	340	1100	53	25

**Goodrich Flexometer operated at room temperature. 30 minute tests. Load 100 psi, stroke 20%.*

SUMMARY OF ADVANTAGES

1. Imparts improved heat resistance—retention of elasticity.
2. Imparts improved heat build-up—cooler running.
3. Relatively faster curing rate.
4. Safe processing.
5. Excellent general physical properties.
6. Broad curing plateau—very little change in properties on overcures.
7. Economical.
8. Available.

The charts illustrated are taken from a report on recent experimental work by the Rubber Division of our Research Laboratories on the problem of heat build-up and heat stability in GR-S stocks. Write for your copy. The report is titled, "The Heat Problem in GR-S Carcass Stocks."

NATIONAL LEAD COMPANY New York, Buffalo, Chicago, Cincinnati, Cleveland, St. Louis, San Francisco; Boston (National-Boston Lead Co.); Pittsburgh (National Lead & Oil Co. of Penna.); Philadelphia (John T. Lewis & Bros. Co.).

SHELL DUTREX 6

Plasticizer and Extender for GR—S

Chemically and physically Controlled

SHELL OIL COMPANY, INC.

50 WEST 50th STREET

NEW YORK 20, N. Y.

announcing:

AN IMPORTANT FORWARD STEP IN CALENDER DESIGN

SINCE the earliest days of the rubber industry, Farrel-Birmingham engineers have worked to promote higher product quality and lower manufacturing costs through the development of more efficient processing equipment. Latest in a long line of pioneering achievements are the individual screw adjustments and other improvements built into this four-roll double coating calender.

Individual motors are provided for each screw of the top, bottom and side rolls. This means that a screw can be operated independently to adjust one end of a roll, but can also be synchronized with the one at the other end for parallel adjustment.

This new design permits precision control of gauge, either automatically or manually. The gauge can be instantly corrected to maintain uniform thickness at the edges — a definite advance in calender design.

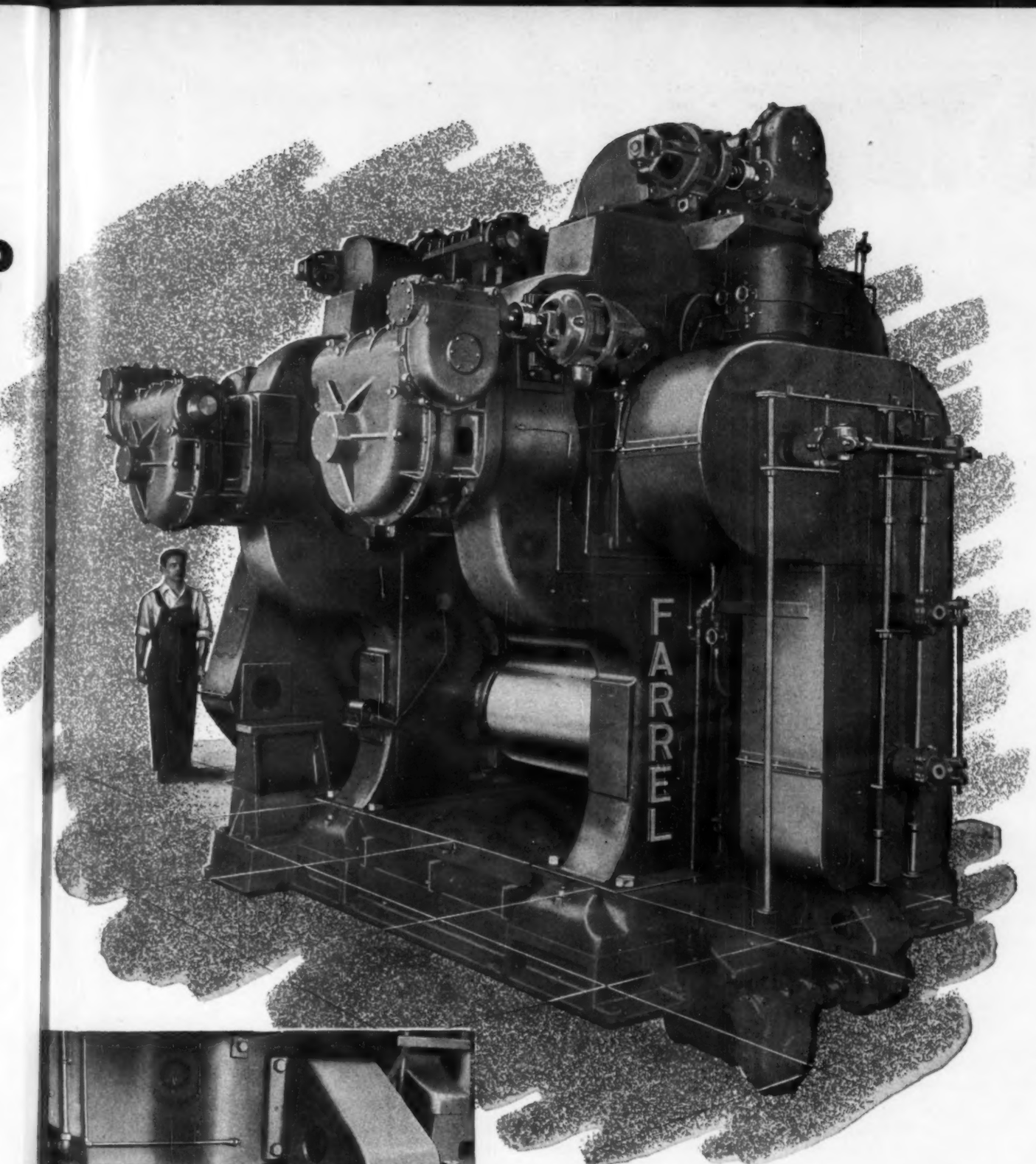
The calender is proportioned in size and weight to the large rolls, which offer more than three times the resistance to deflection ordinarily provided. Effective lubricating systems for the various moving parts contribute to higher operating efficiency, reduced maintenance and longer life.

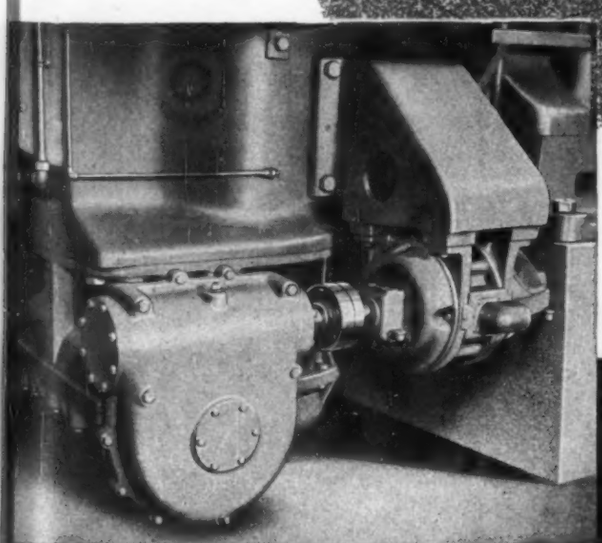
Farrel-Birmingham engineers will be glad to explain how this new contribution to product improvement can be put to work for you. Write for detailed information.

PIONEERING

Other Farrel-Birmingham pioneering achievements include the Banbury Mixer, the Gordon Plasticator, the Hale Pelletizer, and important improvements in roll mills, tubing machines, bale cutters and other equipment used in processing natural and synthetic rubber.

Farrel-Birmingham





FARREL-BIRMINGHAM COMPANY, INC., ANSONIA, CONN.
Plants: Ansonia and Derby, Conn., Buffalo, N. Y.
Sales Offices: Ansonia, Buffalo, New York, Pittsburgh, Akron, Los Angeles

MINERAL RUBBER

AVAILABLE IN STEEL DRUMS

SPECIAL ATTENTION IS BEING GIVEN TO THE NEEDS OF MANUFACTURERS OF PRODUCTS SUCH AS INSULATED WIRE FOR WHICH UNIFORM MELTING POINT AND FREEDOM FROM IMPURITIES ARE REQUIRED.

AVAILABLE IN A RANGE OF MELTING POINTS FROM 265 TO 310° F.

HERRON BROS. & MEYER

82 Beaver Street, NEW YORK 5, N. Y.

516 Ohio Bldg., AKRON, OHIO

Piccolastic resins

Based on Styrene, substituted Styrenes and Homologues

Provide new and improved characteristics

PICCOLASTIC GRADES
Piccolastic Resins · Number Schedule

A Soft Plasticizing	B Hard Brittle	C Flexible	D Hard Tough	E Flexible to Tough	F Hard Horny in Solvent
A-5	....	C-5	....	....	....
A-25	....	C-25	....	....	....
A-50	B-50	C-50	....	E-50	....
A-75	B-75	C-75	D-75	E-75	....
....	B-100	C-100	D-100	E-100	....
....	....	C-125	D-125	E-125	....
....	....	....	D-150	....	FT, FX, FHF

KEY TO NUMBERING CHART:—The numbers opposite each of the letters refer to the approximate Melting Point of the resin in °C, Ball and Ring Method. All members of the A, B, C, D and E series are solid resins, containing all non-volatile matter.
The F series each contains 55% of a resin of approximately 150°C melting point, dissolved in 45% of an aromatic solvent. FT contains Toluol (when available), FX contains Xylol and FHF contains High Flash Naphtha.

PICCOLASTIC
STYRENE, SUBSTITUTED STYRENE AND HOMOLOGUES

In the rubber industry, the new Piccolastic Resins offer a means of getting results hitherto unobtainable. The various types of these thermoplastic hydrocarbon resins provide an almost unlimited range of properties because they may be readily intermixed or combined with other plastic bodies. Most are pale color, suitable for the majority of uses. Molecular weights, solvencies, melting points and other physical properties vary in the several types, over a wide range, but are fixed and dependable for any one type.

Preliminary investigations have shown decided advantages are to be gained by the use of Piccolastic Resins for rubber compounding, plasticizing and extending, for making adhesives and laminating agents of many types, electrical insulating materials and other products. Additional fields in which Piccolastic provides desirable characteristics will occur to the manufacturer investigating newly developed materials or processes for future use.

Extensive knowledge of resin syntheses and their application to the requirements of the rubber industry have been gained by our staff through years of research and field experience. This knowledge is available to help you make most effective use of Piccolastic in your operations.

Write for descriptive bulletin giving complete data and physical properties of Piccolastic.

PENNSYLVANIA INDUSTRIAL CHEMICAL CORPORATION
CLAIRTON, PA.
Makers of: Coumarone Resins · Coal Tar Naphthas · Rubber Plasticizers · Reclaiming Oils · Terpene Resins
Distributed to the rubber industry by Standard Chemical Co., Akron, Ohio

A combination that's become a *Lasting Friendship*

LASTING is exactly the word for it. For the combination of wire and rubber has brought about greater *lasting* qualities for tires, V-belts, flat conveyor belts, hose, and scores of other rubber products.

Yes, wire reinforcement of rubber eliminates stretching, increases tensile strength, elasticity, and rigidity—makes rubber better able to do the important jobs in store for it.

That's why we at National-Standard are devoting so large a part of our time and resources to developing better wire and methods of application for every conceivable wire-and-rubber combination—wire that meets not only the specifications of today, but presents to both the rubber industry and ourselves, *new* product possibilities for *tomorrow.*

So, if you have a problem along that line, perhaps our experience and research facilities can be of help . . . and it *may* lead to a *lasting* friendship.

BUY WAR BONDS AND STAMPS

NS
NATIONAL STANDARD
Company

Divisions of National-Standard Company

NATIONAL-STANDARD
Niles, Mich.
TIRE WIRE, FABRICATED BRAIDS AND TAPE

ATHENIA STEEL
Clifton, N. J.
COLD ROLLED, HIGH-CARBON SPRING STEEL

WAGNER LITHO MACHINERY
Hoboken, N. J.
LITHOGRAPHING AND SPECIAL MACHINERY

WORCESTER WIRE WORKS
Worcester, Mass.
ROUND STEEL WIRE, SMALL SIZES

BAKER PLASTICIZERS

IMPART

1. Low Temperature Flexibility
2. Retained Flexibility

to

Vinyl Resins
Phenolic Resins
Urea Formaldehyde Resins
Cellulose Resins
Melamine Resins
Styrene Resins

and

3. Improved Properties

to

Buna-S
Buna-N
Neoprene

THE BAKER CASTOR OIL COMPANY

Established 1857

Jersey City, New Jersey
120 Broadway, New York 5, New York
Los Angeles, California
Bayonne, New Jersey

Baker Plasticizers Contain NO Phthalate

Technical Bulletin No. 6 — on the Compounding of GR-S with Substantial Loadings of Zinc Oxide

A "Santocure" Accelerated Compound

THE USE of "Santocure" as the accelerator in GR-S compounds reinforced with 16 volumes of Zinc Oxide develops flat-curing compounds of moderate tensile strength and high elongation, and with modulus values holding practically constant over a range of cures. This compound is excellent from the standpoint of resilience and heat generation, but is somewhat deficient in cut-growth resistance.

COMPOUND NO. 6	
GR-S	100.0
Sulfur	3.0
"Santocure"	1.5
E.L.C. Magnesia	5.0
Cumar MH 2½	7.5
Zinc Oxide	100.0

ORIGINAL RESULTS

Time of Cure Min. at 45 Lb.	Tensile Strength Lb./Sq. In.	Per Cent Elongation	Load (Lb./Sq. In.) For Elongation of			Permanent Set
			200%	300%	400%	
7.5	1220	585	165	245	405	.20
15	1120	515	250	375	540	.17
30	1040	490	250	330	540	.15
45	1090	500	250	335	545	.17
60	935	480	245	325	530	.13
90	1050	500	260	350	525	.13

Time of Cure Min. at 45 Lb.	Shore Hardness	Goodyear-Healey Pendulum		Compression Fatigue (Goodrich Flexometer)*					Cut-Growth Resistance Inches Failure at
		Indentation in mm.	Per Cent Rebound	Per Cent Initial Comp.	Running Time and Per Cent Permanent Set	Max. Temp. Rise °C.	Dynamic Compression		
							Initial	Final	13,000 Cyc.
45	49	8.21	64.7	22.6	15'— 2.6	12.3	13.9	16.0	.50
60	50	8.28	65.1	22.1	15'— 2.8	12.0	13.5	15.4	

*Test Conditions: 100 Lb. Load. 0.15" Stroke. 100°C. Oven Temp.

Since the sulfur-accelerator ratio plays such an important part in obtaining optimum properties in high zinc oxide compounds, further studies are in progress with this accelerator, including the addition of secondary accelerators, which will be reported later.

THE NEW JERSEY ZINC COMPANY
160 FRONT STREET • NEW YORK 7, N. Y.
Products Distributed by THE NEW JERSEY ZINC SALES COMPANY
NEW YORK • CHICAGO • BOSTON • CLEVELAND • SAN FRANCISCO

The C. P. Hall Co.
CHEMICAL MANUFACTURERS

ACCELERATORS

PLASTICIZERS

ANTIOXIDANTS

A Complete Line of Approved Compounding Materials

AKRON, OHIO • LOS ANGELES, CALIF. • CHICAGO, ILL.

SYNTHETIC RUBBER & RESIN COMPOUNDS

Custombuilt

FOR YOUR PRODUCT OR PROCESS

A few Applications of GENERAL LATEX Product Development

Aircraft Cements
Carpet Backing
Can Sealing
Cable and Wire
Combining Compounds
General Adhesives
Hose and Belting
Impregnating Compounds
Pile Fabrics
Protective Clothing
Shoe Adhesives
Sizings

A practical approach to the use of synthetic dispersions in your product is to refer your problem to our laboratory. No matter what the process—coating, impregnating, or bonding—our experienced technical staff can compound the material best suited to your requirements. In the case of an entirely new product, we will work out all the details of manufacturing procedure—from pilot operations to commercial production in your plant. Why not talk it over with one of our technical representatives?

GRS latex types 2 and 3, normal and concentrated, available from stock.

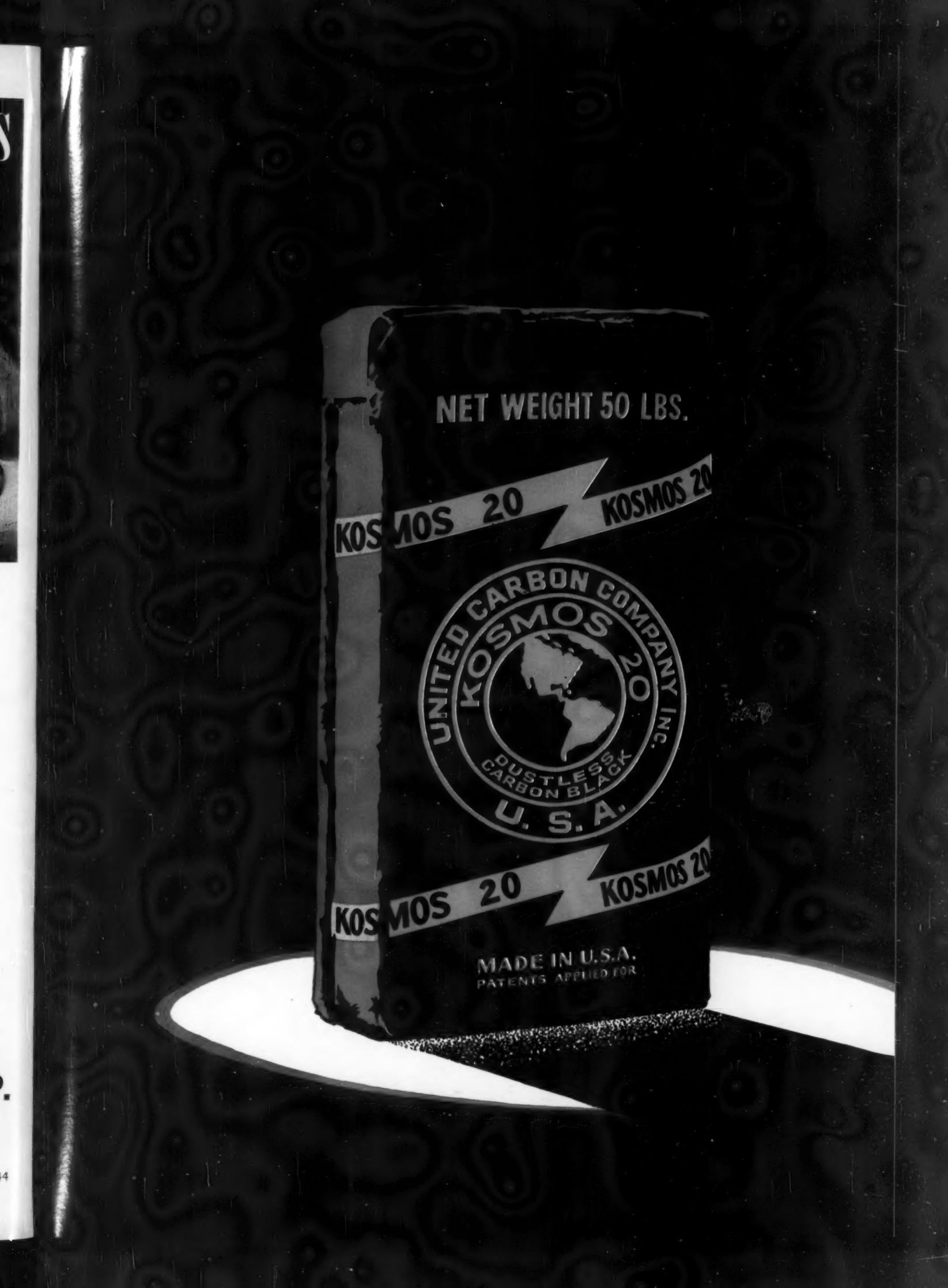
A Complete Service to Manufacturers

RESEARCH • MATERIALS • ENGINEERING • MANUFACTURE

General Latex & CHEMICAL CORP.

666 MAIN STREET, CAMBRIDGE, MASS.

Agents for Rubber Reserve Company for storage and distribution of natural rubber latex. Distributors for Rubber Reserve Company for synthetic latex. Operators of the Government-owned Baytown, Texas, synthetic rubber plant in collaboration with the General Tire & Rubber Co.


NET WEIGHT 50 LBS.
KOSMOS 20
KOSMOS 20
UNITED CARBON COMPANY INC.
KOSMOS 20
DUSTLESS CARBON BLACK
U. S. A.
KOSMOS 20
KOSMOS 20
MADE IN U.S.A.
PATENTS APPLIED FOR

KOSMOS 20

KOSMOS 20 is a semi-reinforcing (SRF) type carbon black made by United's special furnace process.

IDEAL for the GR-S and other rubbers used in military and civilian goods.

OUTSTANDING for ease of processing, good plasticity, fast rate of cure, high resiliency, and low heat build-up.

WELL-KNOWN for uniform quality and performance.

RECOMMENDED for blending with channel black for moderate reinforcement and low heat build up.

KOSMOS 20 is a Strong Rubber Favorite.

RESEARCH DIVISION

UNITED CARBON COMPANY, INC.

Charleston, West Virginia

Setting *New* Standards of Performance . . .

For a Coal Tar Type softener and plasticizer PICCOVOL is now giving to many in the Industry new conceptions of possibilities for product improvement . . . PICCOVOL was developed to meet the specifications of Rubber Reserve Company — but it also provides greater tear resistance, higher tensile, improved elongation and better aging qualities in the finished products . . . It is available now in unlimited quantities.

PICCOVOL

★
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Manufactured by Pennsylvania Industrial Chemical Corp.

STANDARD *Chemical Company*

General Offices: AKRON 8, OHIO

LOEWENTHAL

LINKED TOGETHER SINCE 1868

RUBBER

Rubber has been our business since its inception and we have served rubber reclaimers with scrap from the beginning of their industry.

The result is experience, "know how" and facilities that insure proper service today—scrap properly sorted to specification and prompt deliveries.

THE LOEWENTHAL CO.

JACK SIDER, *President* — J. K. McELLIGOTT, *Exec. Vice-Pres.*

We Solicit Your Inquiries

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Cable Address: "Gyblowell"

159 CLEWELL STREET
AKRON 5, OHIO

RUBBER and PLASTICS TESTING EQUIPMENT by "PRECISION"

To its present line of over 2,500 items of Scientific Research and Production Control Equipment, "Precision" introduces a complete line of Rubber and Plastics testing apparatus. Shown below are a few representative items. "Performance Tested" and approved by our own and other leading laboratories throughout the country, this equipment embodies the same engineering features and high standards of workmanship found in all other "Precision Products".

"PRECISION"-SHELL CONTINUOUS FLOW REFRACTOMETER
Indicates purity thru refractive index. Connected directly into processing pipeline.

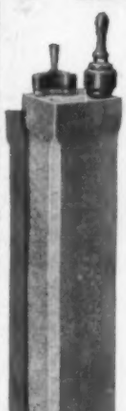
AGING JIG
Naval Research Laboratory Rubber Seal Aging Test Jig. Used to test rubber gaskets to specification 33R9 INT. Duplicates service conditions.

PERMANENT SET TESTING APPARATUS
For tension testing of rubber. ASTM D-412-41 and Federal Specification ZZR-601. Holds 6 samples. Individual clutches for each sample.

CRESCENT TEAR TEST JIG
Used for slitting the crescent tear test pieces according to A.S.T.M. D-624. The slitting depth gage on the right also furnished.

FLOW TESTER ASTM D-536
For measuring flow of hard rubber and plastic under pressure. Equipped with dial indicator.

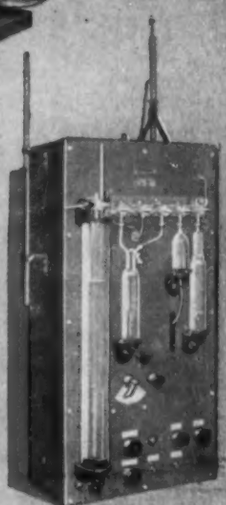
PRECISION TEAR TESTER
Utilizes ¾" diameter die sample died from regular tensile slab. Fits standard tensile machines. Consistent and rapid in operation. Duplicates service conditions.



DIES
Dies of all sizes for tensile and tear tests, including 2" x ½", 2" x ¼", 1" x ¼", 6" x 1", and 1.129" diameter. All to ASTM specifications.

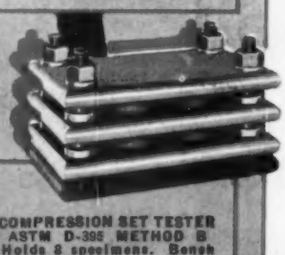
DIE BLOCK
For cutting tensile test pieces. Made from carefully selected end maple 8" square. Convenient 3 ft. height. Mounted on sponge rubber to absorb shock.

MALLET
For dicing test samples. Durable rawhide shockproof construction.



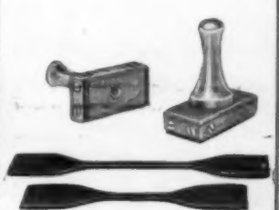
"PRECISION"-SHELL BUTADIENE ANALYZER
Determines butadiene by Gas-Volumetric Method.

PRECISION-ZAHN VISCOSIMETER
For fast, accurate viscosity measurements of cements and solutions. Test can be run in less than a minute. Supplied in 5 orifice sizes.



COMPRESSION SET TESTER ASTM D-395 METHOD B
Holds 8 specimens. Bench plate makes this apparatus extremely easy to handle. The usual spacers are replaced with washers which cannot become lost.

COMPRESSION FATIGUE CELLS
Used to confine rubber under compression for long periods during which time compression fatigue is measured by observing the decrease in the pressure exerted by the sample.



GAGE MARKER
For marking elongating marks on tensile test pieces makes both the 2" and 1" marks. Fine line produces less error. Light weight, made to fit the hand.

"PRECISION"-BASHORE RESILIOMETER
A necessity for synthetic development and compounding since resilience can no longer be taken for granted in an elastomeric compound.

SEE YOUR LABORATORY SUPPLY DEALER

PRECISION SCIENTIFIC COMPANY

1736-54 N. Springfield Ave., Chicago 47, U.S.A.

★ *Engineers and Builders of Scientific Apparatus and Production Control Laboratory Equipment for Almost a Quarter Century* ★

America's Baby No. 1

Three years ago, he was dumped on the doorstep of America's chemists and engineers. Today, he's a full-grown elephant . . . an industrial miracle.

For this foundling was synthetic rubber, and the problem of making enough to meet our needs before the exhaustion of our natural rubber stockpiles has already been answered with a program to provide 850,000 long tons a year.

In this herculean achievement, Barrett coal-tar products have had an important part. They help in the processing of every type of rubber—synthetic, natural and reclaim—making it more usable and imparting to it a wide variety of desirable characteristics.

The Barrett Division maintains a complete, fully equipped and fully staffed Rubber Research Laboratory, and the services of Barrett chemists and engineers are available to you in adapting Barrett Coal-tar Chemicals to your requirements. Your inquiries will receive prompt attention.

Barrett Rubber Compounding Materials — Carbonex* • Carbonex S • Carbonex S Plastic • Cumar* • Bardol* • Bardol B • Dispersing Oil No. 10 • Dispersing Oil No. 64 • B.R.H.* No. 2 • B.R.T.* No. 3 • B.R.T. No. 7 • B.R.V.* • S.R.O.* • Reclaiming Oil No. 1621 • B.R.C.* No. 20 • Resin-C*-Pitch.

*Trade-mark Reg. U. S. Pat. Off.

THE BARRETT DIVISION
ALLIED CHEMICAL & DYE CORPORATION
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General Chemical "B&A" Reagent Acids and Ammonia

Quality in quantity shapes success...increases product potentialities. That's why, wherever *reagent grade mineral acids or ammonia in commercial quantities* are specified for industrial operations, General Chemical "B&A" high purity products are an outstanding choice nation-wide.

These reagents from America's foremost producer of mineral acids conform to exacting A.C.S. specifications. Their quality and purity are the result of General Chemical's progressive research and advanced reagent production technique, combined with invaluable "know-how" gained during almost half a century's manufacture of basic chemicals for industry.

Specify and rely on General Chemical "B&A" Reagent Acids and Ammonia for your operations. Remember...their dependability has been "proved in production" by America's leading manufacturers!

GENERAL CHEMICAL COMPANY

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40 RECTOR STREET, NEW YORK 6, N. Y.

Technical Service Offices: Atlanta • Baltimore • Boston • Bridgeport (Conn.) • Buffalo • Charlotte (N. C.) • Chicago • Cleveland • Denver Detroit • Houston • Kansas City • Milwaukee • Minneapolis • New York Philadelphia • Pittsburgh • Providence (R. I.) • St. Louis • Utica (N.Y.)

Pacific Coast Technical Service Offices:
Los Angeles • San Francisco • Seattle, Wenatchee and Yakima (Wash.)

In Canada: The Nichols Chemical Co., Ltd. • Montreal • Toronto • Vancouver

B·A STANDARDS OF PURITY

General Chemical Reagent Acids and Ammonia are produced by the Company's Baker & Adamson Division, makers of laboratory reagents and fine chemicals since 1882. The experience of this Division with high quality chemicals embraces over 1,000 purity products.

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"B&A" Sulfuric Acid, Reagent, A.C.S.
Sp. Gr. 1.84
"B&A" Hydrochloric Acid, Reagent, A.C.S.
Sp. Gr. 1.18–1.19
"B&A" Nitric Acid, Reagent, A.C.S.
Sp. Gr. 1.42
"B&A" Ammonium Hydroxide, Reagent, A.C.S.
Sp. Gr. .90
"B&A" Acetic Acid Glacial, Reagent, A.C.S.

Quantities: "B&A" Reagent Acids and Ammonia are available in carboys as well as in five-pint or one-pound bottles, which are obtainable in case lots or less.

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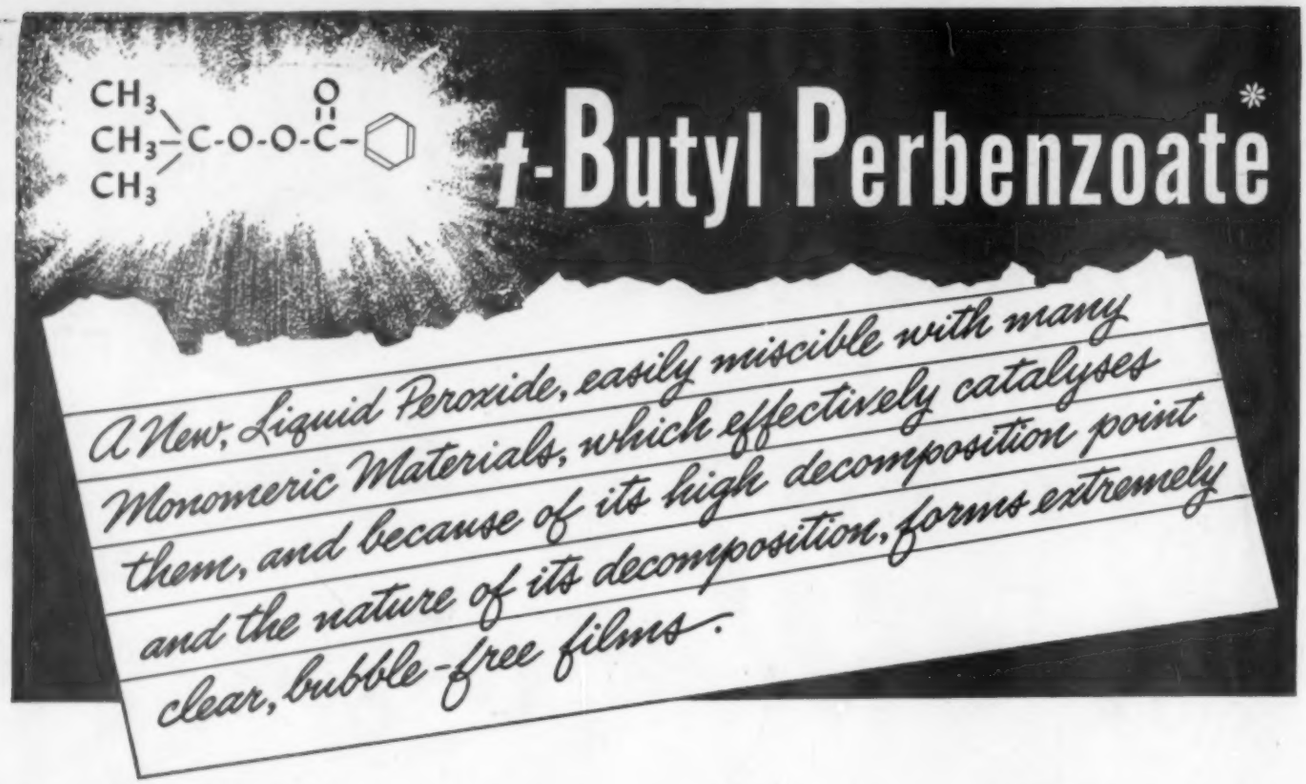
Stocked at key locations throughout the nation.


CH3
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t-Butyl Perbenzoate*
A New, Liquid Peroxide, easily miscible with many Monomeric Materials, which effectively catalyses them, and because of its high decomposition point and the nature of its decomposition, forms extremely clear, bubble-free films.

GENERAL DESCRIPTION

A liquid, organic peroxide (8.00–8.50% available oxygen) which is relatively non-volatile and highly stable.

SUGGESTED USES

1. As an effective catalyst in bulk polymerizations.
2. As an extremely good high temperature polymerization catalyst.
3. Wherever organic peroxides are of interest.

PROPERTIES

Molecular Weight	194
Specific Gravity at 20° C.	1.035
Vapor Pressure	Less than 10mm. of mercury at 100° C.
Decomposition Point	113–116° C.
Freezing Point	–2° to –4° C.
Refractive Index at 25° C.	1.489
Available Oxygen	8.00 to 8.50%
Color	Light Yellow
Solubility	Soluble in all proportions in all common organic solvents.
Sensitivity	Insensitive to shock, rubbing, grinding.
Stability	Highly stable at room temperature. Stable over iron, aluminum, copper, tin and zinc. Decomposes slowly over lead.

Practically all the technical information known at present about this interesting new peroxide is given here. The product is in limited commercial production, and samples will be gladly sent to anyone interested in investigating its possibilities.

TWO OTHER PEROXIDES OF INTEREST . . .

t-BUTYL HYDROPEROXIDE*

An organic, alkyl peroxide that is standardized at a concentration of 60% (10.66% available oxygen). Use of proper activators increases rate of release of the oxygen. In limited commercial production at present. Samples will be gladly sent anyone interested.

1-HYDROXYCYCLOHEXYL HYDROPEROXIDE-1*

An organic, cycloalkanyl peroxide in white crystalline solid form that is extremely stable at room temperature and possesses 12.13% active oxygen. Has been produced in our laboratory on a small scale and can be made in commercial quantities if there is sufficient demand. Samples will be gladly made up upon request.

*U. S. Pats. 2176407, 2223807 & 2298405

Address all inquiries to the Union Bay State Chemical Company, Peroxides Division, 50 Harvard Street, Cambridge 42, Massachusetts.

UBS

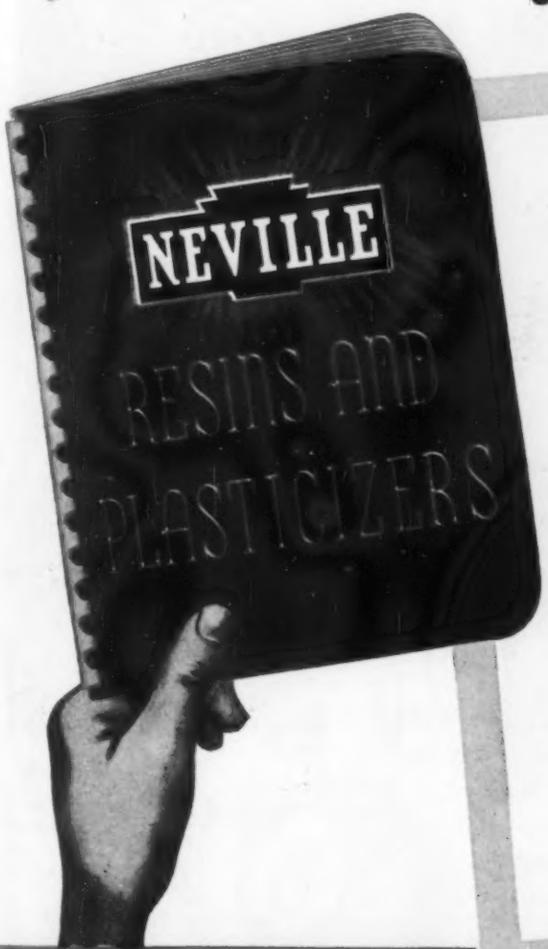
UNION BAY STATE
Chemical Company

Serving Industry with Creative Chemistry

ORGANIC CHEMICALS · SYNTHETIC LATEX · SYNTHETIC RUBBER
PLASTICS · INDUSTRIAL ADHESIVES · DISPERSIONS
COATING COMPOUNDS · IMPREGNATING MATERIALS · COMBINING CEMENTS

Your Guide ...

TO THE NEVILLE LINE of Resins and Plasticizing Oils



IT'S Neville's latest hand-book on Resins and Plasticizing Oils, containing a wealth of information that should prove a convenient guide to the proper selection of the right Neville product to meet your problems.

In its 64 pages are listed grades, specifications and uses of each of the many Neville Resins or Plasticizers. Write for your copy today!

A-15

THE NEVILLE COMPANY

PITTSBURGH · PA.

Chemicals for the Nation's War Program

BENZOL • TOLUOL • XYLOL • TOLLAC • NEVSOL • CRUDE COAL-TAR SOLVENTS
HI-FLASH SOLVENTS • COUMARONE-INDENE RESINS • PHENOTHIAZINE • TAR PAINTS
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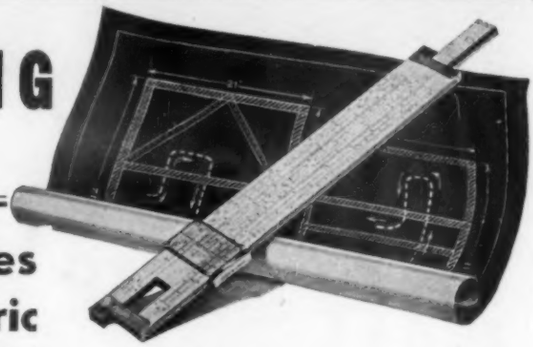
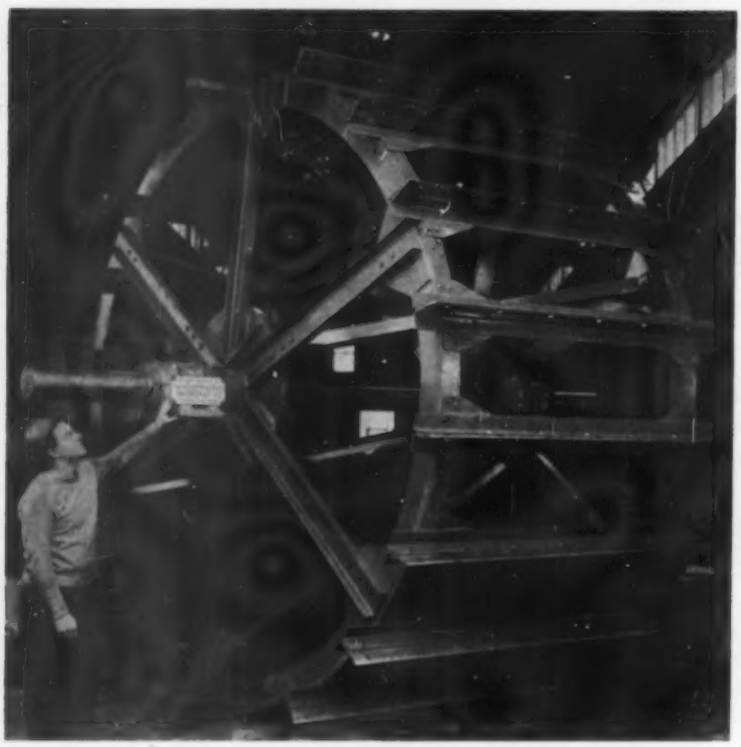
RECLAIMING, PLASTICIZING, NEUTRAL, CREOSOTE, AND SHINGLE STAIN OILS

OVEN ENGINEERING NEWS



Four-ton Dryer Wheel Handles Weftless and Woven Coated Fabric In IOE Fabric Processing Unit



Simple and effective systems for the processing of modern synthetic coated fabrics often present complex engineering problems.

Take the big dryer wheel shown above, for instance. It is the basis of an **IOE** system designed for processing coated and calendered weftless fabric, and makes many of yesterday's vexing problems look simple today. Twelve feet in diameter, it weighs four tons and revolves on a 6½-inch shaft, yet it is so delicately balanced and is driven at such closely controlled speeds that the finest materials ride gently over its work carriers without danger of marking or breakage. It handles woven materials up to 72 inches wide or weftless fabric containing as many as 50 ends per inch of fabric, under a maximum tension of 500 pounds per foot of fabrics, *at the unprecedented speed of 100 yards per minute.*

Both dryer wheel and auxiliary drum processing equipment are driven by electronically-controlled magnetic clutch motors, synchronized with the main calender drive of the processing system. **IOE** "convection-plus" heating, assisted by properly designed dip tanks and excess material removal units, provides drying speeds commensurate with top handling speeds of the system.

Statistics on this wheel-type dryer are presented here as exemplary of the thorough and ingenious engineering which underlies every system designed and installed by the Industrial Oven Engineering Company, whether for tire fabric cementing, woven or weftless fabric latex dipping, coated fabric dipping and drying, or continuous material processing systems. **IOE** supplies creel rooms, unwind stands, dip tanks, roller coaters, dryers, wind-up stands and complete drive systems for rubber or plastic coated fabrics, as well as complete processing systems for the rubber, wire, paper and textile industries.

CALIFORNIA ENGINEER JOINS IOE STAFF

W. A. Clements

W. A. Clements, heating and instrument engineer of Glendale, Calif., has joined the **IOE** staff as district engineer in the California territory. Mr. Clements, a mechanical engineering graduate of the University of California, heads the Automatic Control and Equipment Company of Glendale.

Write for This Engineering Bulletin

"Blueprint for Industry — Part III", dealing with the **IOE** method of winding continuous materials of any kind, has just been issued. Write for it TODAY!

(This is No. 17 of a series. Reprints of previous advertisements will be sent free upon request.)

IOE ENGINEERING VERSATILITY

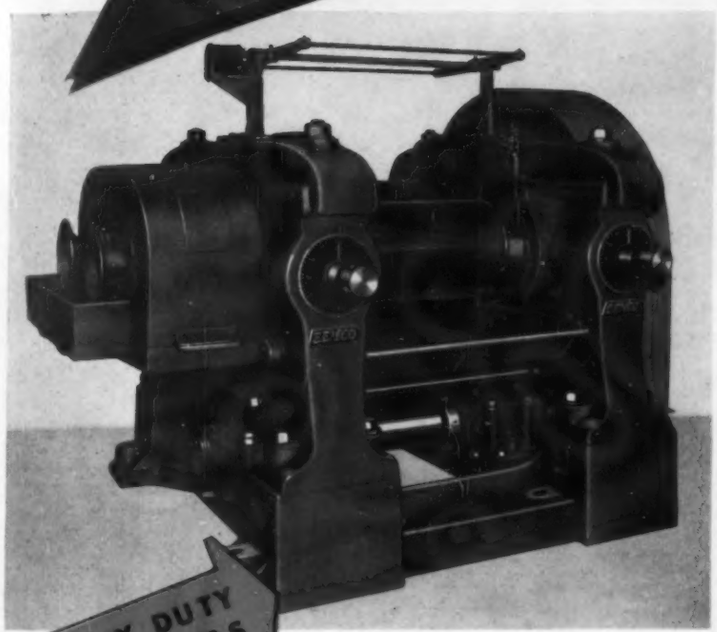
THE INDUSTRIAL *Oven Engineering* COMPANY

11621 DETROIT AVE., CLEVELAND 2, OHIO

Engineering Representatives in Principal Industrial Areas

★ **ASSOCIATED COMPANY: JAMES DAY MACHINERY LTD., LONDON, W. 1, ENGLAND** ★

MILLS-CRACKERS REFINERS-WASHERS



Built for heavy duty and long life, EEMCO Mills, Crackers, Refiners and Washers are exceptionally sturdy. Furnished as individual units or in a "line" of two or three. EEMCO equipment operating as single units may be built with floor level drive. Early deliveries are now being made on Rubber and Plastics Processing Machinery. Write EEMCO if your requirements include any of the items enumerated below.

Sales Representatives

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907 Akron Savings & Loan Bldg.
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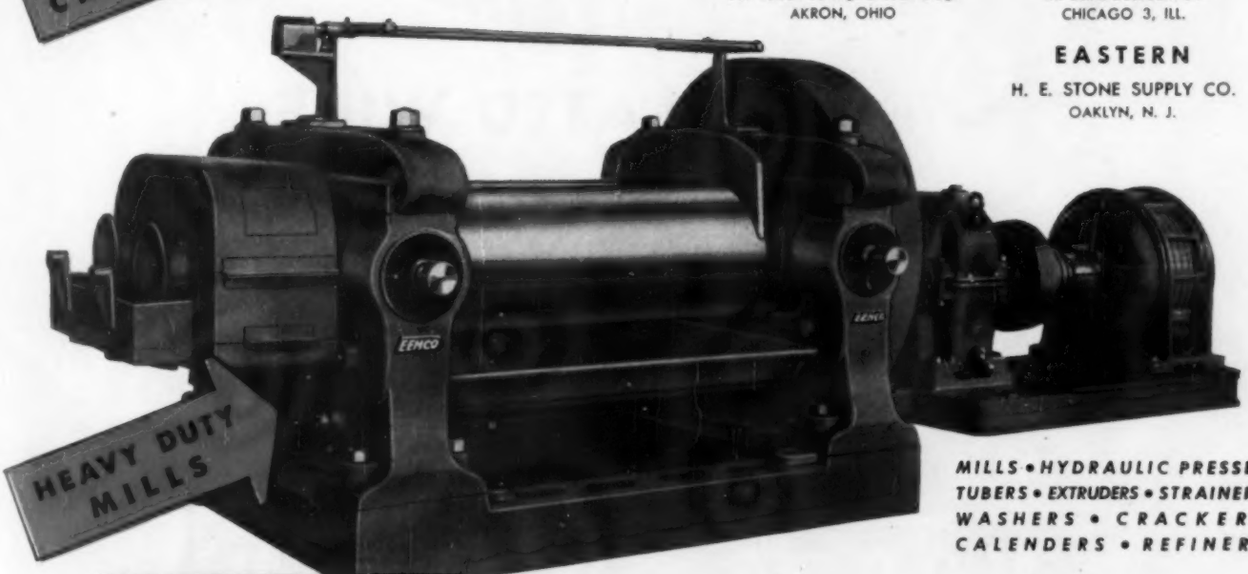


MILLS • HYDRAULIC PRESSES
TUBERS • EXTRUDERS • STRAINERS
WASHERS • CRACKERS
CALENDERS • REFINERS

EEMCO — ERIE ENGINE & MFG. CO.

953 EAST 12th ST., ERIE, PENNA.

for **INSULATED WIRE**

Tensile Strength

Resistance to aging

Dielectric strength

Write Our Technical Service Dept. for Details

MOORE & MUNGER

33 RECTOR STREET - NEW YORK CITY

A *Working* PRINCIPLE

. . . AN *Idea* WITH ITS SLEEVES ROLLED UP!

The PRINCIPLE of continuous, automatic proportioning is WORKING in America's vital process industries. Thousands of %Proportioneers% installations, born as pilot plant ideas, are today proving this principle, bringing modern processing to streamline the production of many a timely product.

PENICILLIN
AVIATION GASOLINE
PLASTICS
MINERAL OILS
SYNTHETIC RUBBER
PAINTS
INSECTICIDES
FOOD PRODUCTS OILS
AND MANY OTHERS

Send for Bulletin 1700

% PROPORTIONEERS, INC. %

WRITE TO %PROPORTIONEERS, INC.%, 66 CODDING ST., PROVIDENCE 1, RHODE ISLAND

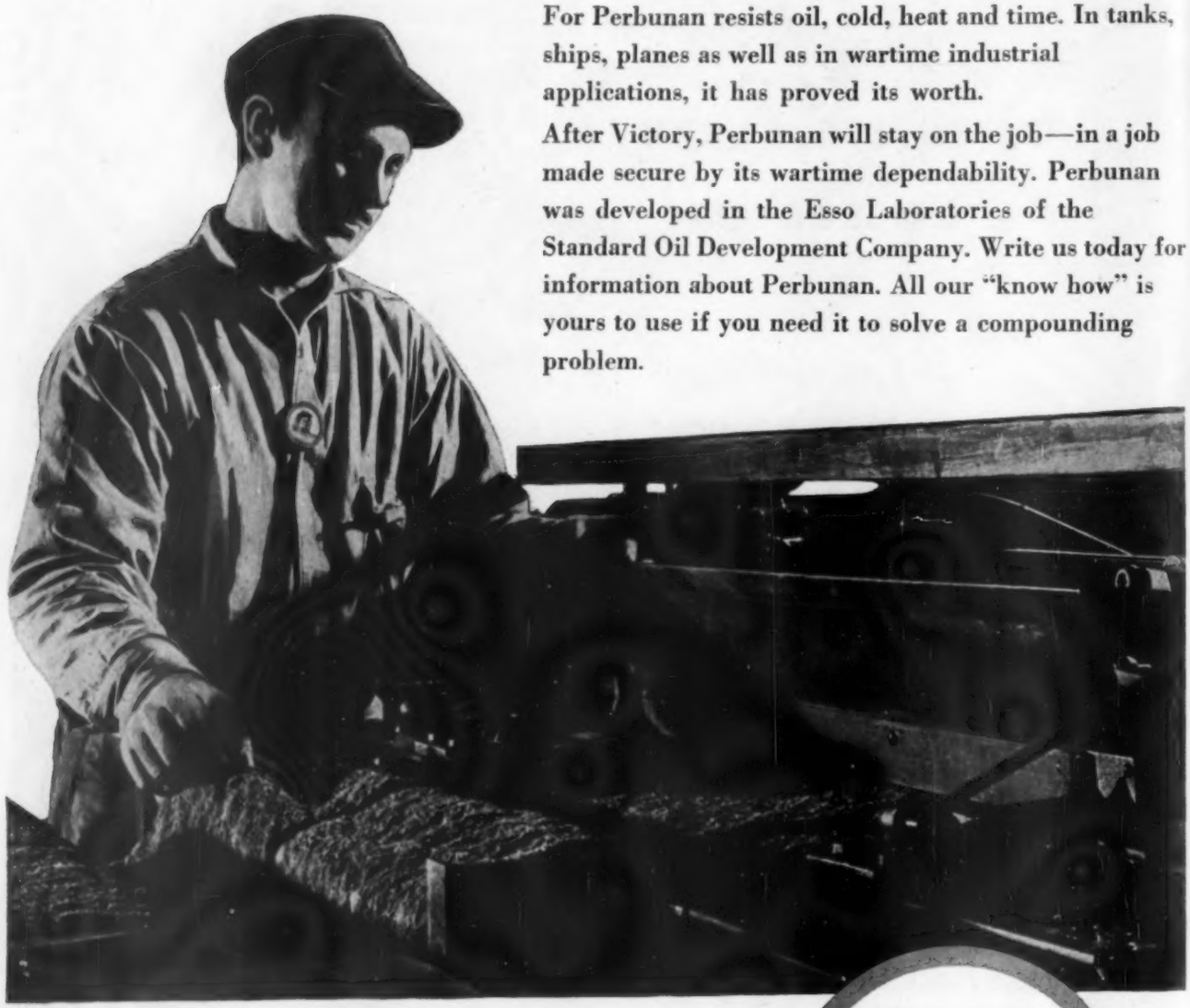
THERE'S NOT A RUBBER MAN in America who doesn't want to get the Japs out of the Malaya and East Indies rubber plantations. They remember the crisis when the Japs seized those places, and shut off our supply of Natural rubber.

What's ahead for Perbunan?...

But they remember how *synthetic* rubber stepped in to fill the need. And how Perbunan filled that need in many cases even better than the natural product!

For Perbunan resists oil, cold, heat and time. In tanks, ships, planes as well as in wartime industrial applications, it has proved its worth.

After Victory, Perbunan will stay on the job—in a job made secure by its wartime dependability. Perbunan was developed in the Esso Laboratories of the Standard Oil Development Company. Write us today for information about Perbunan. All our "know how" is yours to use if you need it to solve a compounding problem.



We take pleasure in announcing the opening of our Akron Office—Room 1002, First-Central Tower, Akron 8, Ohio.

THE SYNTHETIC RUBBER THAT RESISTS OIL, COLD, HEAT AND TIME.

PERBUNAN
REG. U. S. PAT. OFF.

Write STANCO DISTRIBUTORS, INC., 26 Broadway, New York 4, N. Y.
Warehouse stocks in New Jersey, California and Louisiana

When You Plan the Attack

"We go in at Fox Green," the officer explains. "Here's a house right on the beach. The church is up beyond—you'll see the steeple. We'll hit the beach at this point, where there's cover . . ." The amazing accuracy and detail of invasion maps are a striking example of the meticulous planning that has contributed so much to the success of American troops.

You, too, as you plan your postwar attack on new markets and the recapture of those lost since Pearl Harbor, will want to be doubly sure of every factor affecting your business. And that, of course, includes your sources of raw materials supplies.

If you have had no experience with Columbia products, it will pay you to investigate. High product standards, exclusive chemical specialties, centrally located plants, excellent distribution facilities . . . these are Columbia features which may present distinct advantages for your operation.

COLUMBIA CHEMICALS

PITTSBURGH PLATE GLASS COMPANY
COLUMBIA CHEMICAL DIVISION
GRANT BUILDING · PITTSBURGH 19, PA.

CHICAGO · BOSTON · ST. LOUIS · PITTSBURGH · NEW YORK · CINCINNATI
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COLUMBIA SPOTLIGHT

RUBBER MAPS—like that in the illustration—are among the many important new uses of rubber in war. Light, waterproof, unbreakable, they are easy to transport and handle. Their amazing three-dimensional accuracy enables our forces to acquire a familiarity with the terrain of a beachhead or other battle area heretofore impossible . . . to attack with added confidence and skill, saving countless thousands of lives.

BUTADIENE MONOXIDE—Otherwise designated as 3,4-Epoxy-1-butene, or Vinylethylene Oxide, this new compound was last month introduced at the Chemical Industries Exhibit. It offers interesting possibilities in diverse organic processes, such as the production of polymerizable alkyd resins, unsaturated alcohol ethers and esters, and other organic chemicals and pharmaceuticals. Butadiene Monoxide samples and technical data are available to you on request, at no charge.

A NEW ALLYMER—"170" is a new Allymer liquid monomer developed for applications requiring more rapid cures. It may be modified in all proportions with other Allymers—CR 39 and CR 149—the modification of properties being in the direction of those of the Allymer used. Data and samples of this new development of the thermosetting, "contact-pressure" Allymers may be obtained on request.

FREEZE-PROOF COAL—Columbia Calcium Chloride is being used extensively to facilitate cold weather handling of coal. Easily applied, either in flake form or in solution, the Calcium Chloride prevents freezing of coal in transit or in stockpiles. The treatment serves another equally important purpose—effectively dust-proofing the coal for cleaner handling. Write for descriptive literature.

COLUMBIA PIGMENTS
SILENE EF
(Hydrated Calcium Silicate)
CALCENE T
(Precipitated Calcium Carbonate)

PELLETEX and GASTEX for Special Service FOOT WEAR

Photo Courtesy U. S. RUBBER CO.

The sea boot here illustrated has been designed to help men keep their feet warm and secure on the slippery decks of submarines. It is an excellent example of the resourcefulness of the technicians in producing rubber footwear for severe and specific war service. It has been the privilege of General Atlas to cooperate with manufacturers in the development of suitable rubber and synthetic compounds for these special purposes.

The advantages of GASTEX and PELLETEX (dustless GASTEX) Semi-Reinforcing Blacks for waterproof footwear are well-known and outstanding. These properties include easy processing, excellent dispersion and splendid aging producing compounds that stay soft, flexible, and resistant to cracking.

You are invited to consult our technical staff at all times.

HERRON BROS. & MEYER

OHIO BLDG., AKRON, OHIO.

GENERAL SALES AGENTS FOR

GASTEX TRADE MARK

PELLETEX TRADE MARK

GENERAL ATLAS CARBON

PAMPA, TEXAS—GUYMON, OKLA.

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HERRON & MEYER, Chicago
H. M. ROYAL, INC., Trenton, N. J.
ST. LAWRENCE CHEMICAL CO., LTD., Toronto - Montreal

In rubber compounding, we're looking at one goal

CONTRIBUTING to Victory is the goal you see as you work on rubber-compounding problems. Our eyes are on the same point as we study ways in which Monsanto chemicals can serve the war-busy rubber industry.

Working together today, as we have for so many years, may lead to the simplification of complicated problems. The combination of your experience in rubber compounding and production and our knowledge of chemicals as applied to rubber compounding can, we believe, make a substantial contribution to speeding the day of peace.

If you think we might be of assistance on a wartime problem, please call HEmlock 6191 and a technical representative will be on his way to serve you, or if you prefer, write: MONSANTO CHEMICAL COMPANY, Rubber Service Department, Second National Building, Akron, Ohio.

MONSANTO CHEMICALS

SERVING INDUSTRY...WHICH SERVES MANKIND

MONSANTO CHEMICALS
Serving the Rubber Industry

ACCELERATORS
ANTIOXIDANTS
COLORS
PLASTICIZERS
INSOLUBLE SULFUR "60"
WETTING AGENTS

THE DOUGH YOU BLOW —will bring U.S. woe!

What a boom we were handed by World War No. 1! Money came easily —went easily. Everybody was splurging on everything—from silk underwear to diamond sunbursts. Prices went skying. Sugar eventually hit 28¢ a pound!

Bye-bye, boom. Factories closed; men laid off. Prices and wages sinking fast. Wish we'd banked some of that dough we'd blown a few years back! With jobs scarce, that money would have come in mighty handy, then.

Prosperity. Stocks up fifty points in a week. Again everybody was buying everything—yachts, jewelry, stocks, real estate, regardless of cost. Depression? Phooey . . . we thought we'd found a way to lick depression.

Or had we? Bread lines, apple venders. WPA. "Brother, can you spare a dime?" No jobs. Prices dropping. Wages dropping. Everything dropping—except the mortgage on the house. "What goes up must come down."

We're splurging again. Americans have been earning more money. But even today there are fewer goods to spend it on—so naturally prices rise. We must keep them in check. DON'T LET *IT* ALL HAPPEN AGAIN!

---

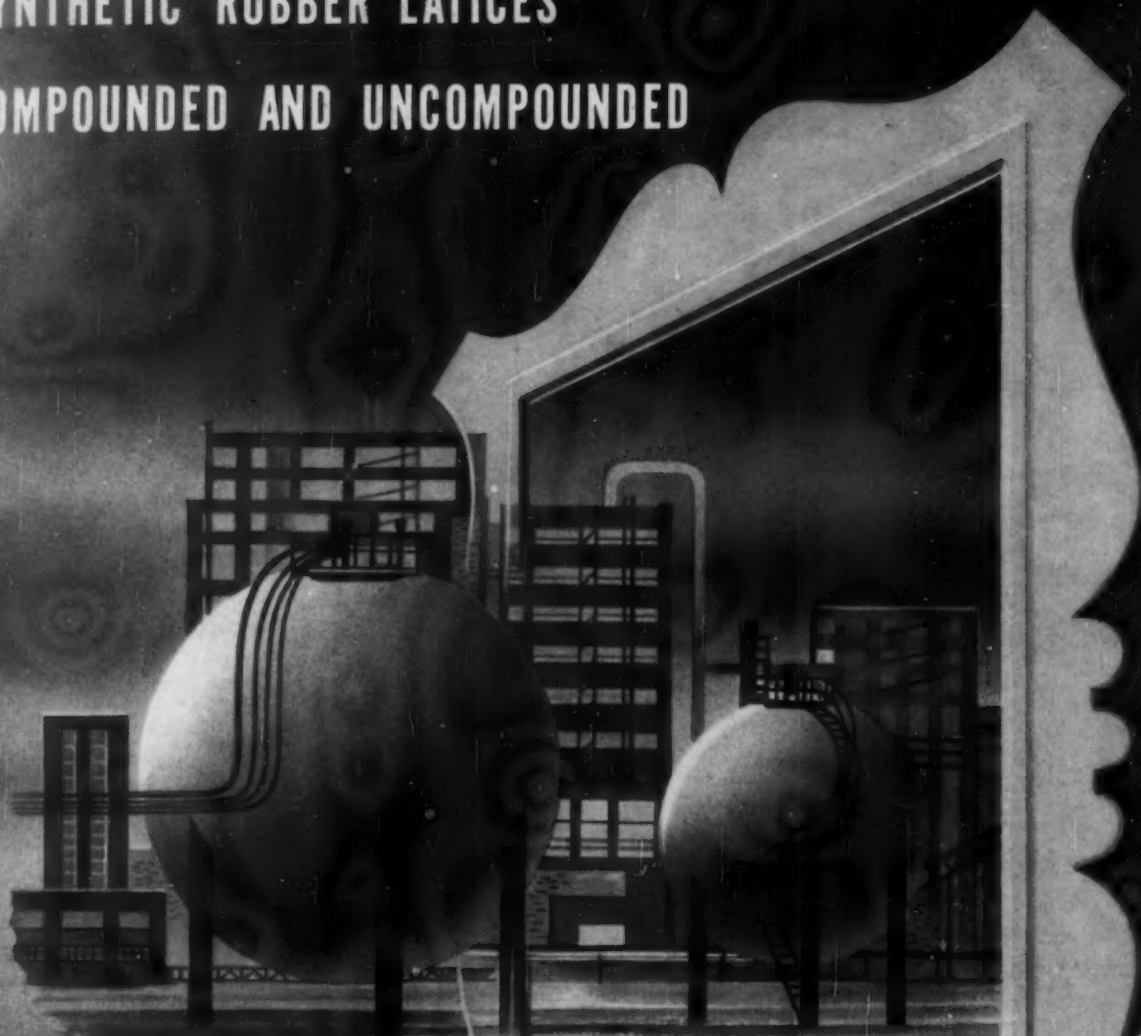
4 THINGS TO DO to keep prices down and help avoid another depression

1. Buy only what you really need.
2. When you buy, pay no more than the ceiling prices. Pay your ration points in full.
3. Keep your *own* prices down. Don't take advantage of war conditions to ask for more—for your labor, your services, or the goods you sell.
4. *Save.* Buy and hold all the War Bonds you can afford—to help pay for the war and insure your future. Keep up your insurance.

A United States War message prepared by the War Advertising Council; approved by the Office of War Information; and contributed by this magazine in co-operation with the Magazine Publishers of America.

SYNTHETIC RUBBER LATICES

COMPOUNDED AND UNCOMPOUNDED



Naugatuck Chemical

DIVISION OF UNITED STATES RUBBER COMPANY

1230 SIXTH AVENUE, NEW YORK 20, N. Y.

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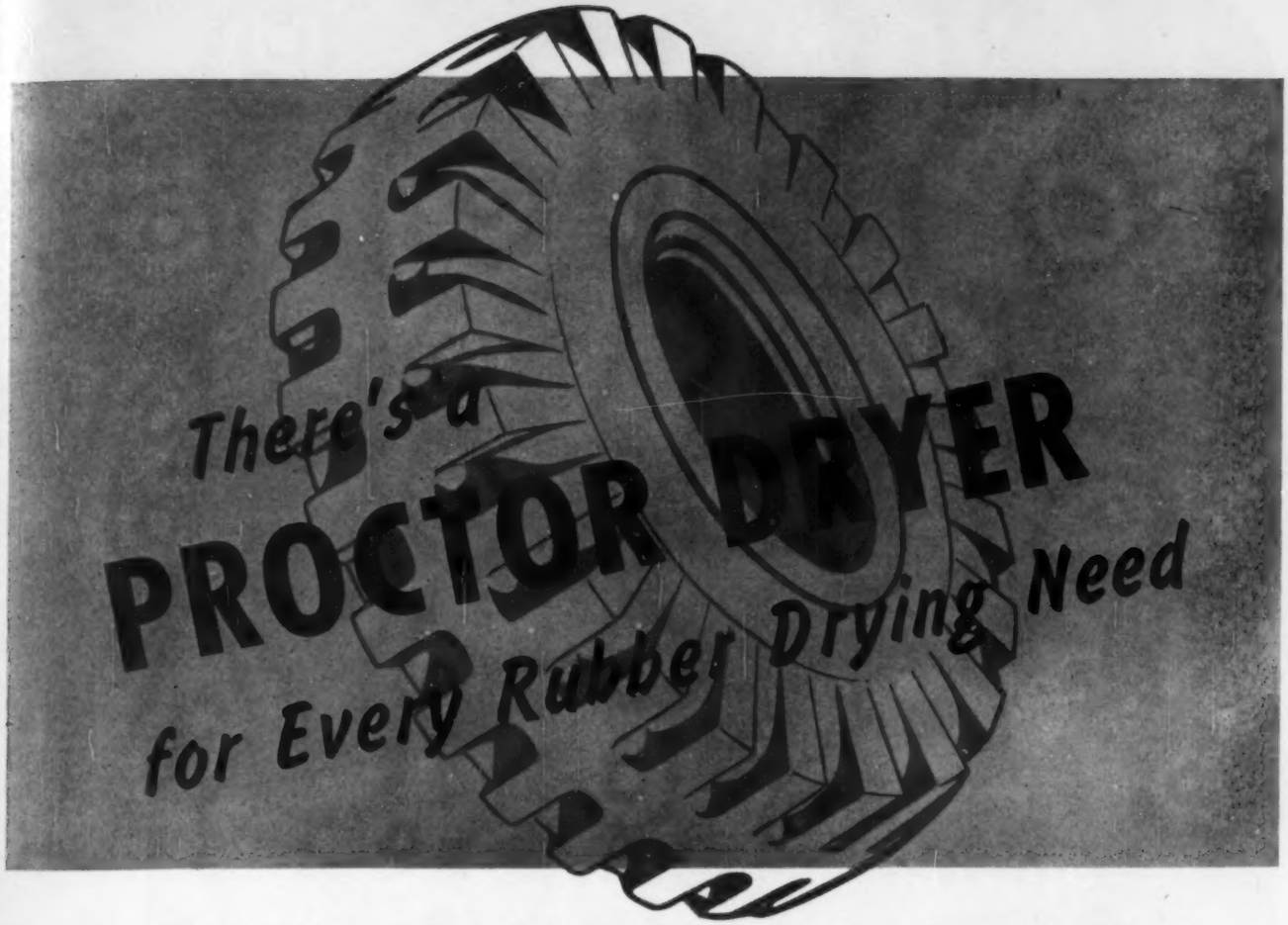

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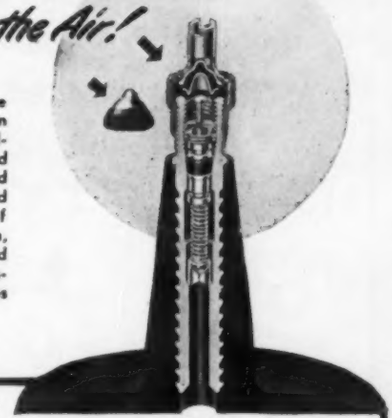

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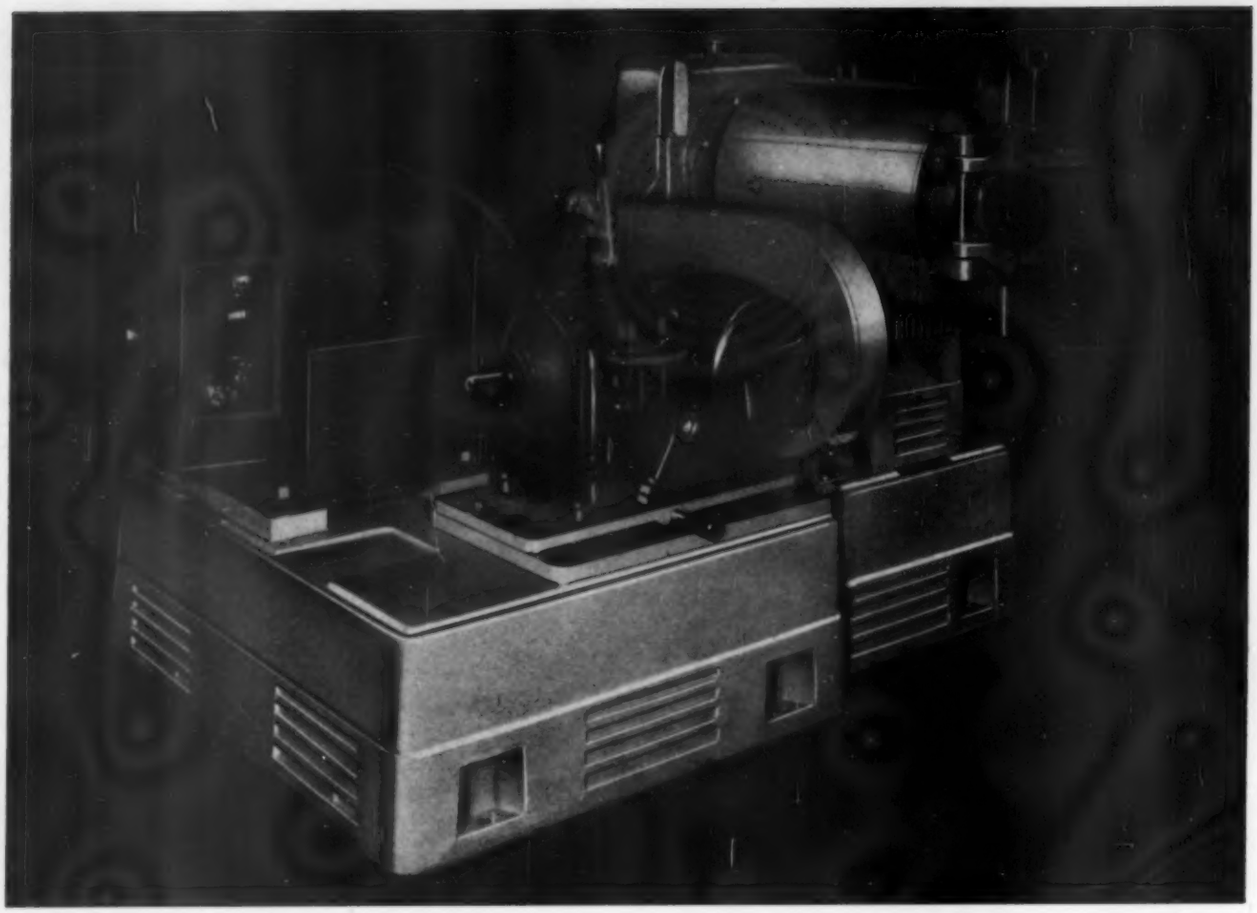

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CONTENTS FOR DECEMBER, 1944

Chrysler Rubber Injection Molding Machine—*By J. V. Hendrick and D. F. Fraser* 277

Hevea Rubber Plantations in Colombia 286

A Post-War Standardization Plan for the Plantation Rubber Industry—*By F. D. Ascoli* 287

A Solution Method for the Compounding of Goldenrod Rubber—*By Forrest L. McKennon and J. Raymond Lindquist* 289

Pliofilm Replaces Rubberized Fabric in Oxygen Tents 292

Advances in Rubber During 1944—*By John W. Liska* 293

REGULAR DEPARTMENTS

New Equipment Section ...	318	Coming Events	308
Book Reviews	322	Obituaries	317
Editorial	301	Los Angeles News	314
Late Domestic News	302	Rubber, Cotton Markets	330
Financial News	312	Chemical Markets	332
Names in the News	313	Market Place	333
Canadian News	316	Classified Ads	338

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The RUBBER AGE

VOL. 56, No. 3 DECEMBER, 1944

Chrysler Rubber Injection Molding Machine

First Complete Details of the Device Which Makes Possible a New Method for the Molding of Rubber

By J. V. HENDRICK[1] and D. F. FRASER[2]

AS is well known, the familiar but comparatively recently developed injection molding process used with many thermoplastic materials permits very high production rates because of the short molding cycles realized by the use of modern injection molding machines. Many rubber technologists have viewed with envy the rapid molding cycles obtained by the plastics industry and have contemplated the advantages which would accrue to their industry if such a process were available for rubber. An injection molding process for rubber, natural and synthetic, which is capable of high production rates has been developed and it is the purpose of this article to discuss this process, its limitations, and its advantages.

Rubber compounds, natural and synthetic, may be regarded as thermosetting materials as differentiated from thermoplastic materials. The molding of both thermosetting and thermoplastic materials requires heat to thermally plasticize the material so that it will flow and properly fill the mold cavity. Thermosetting materials then require additional heat to complete the cure while the thermoplastic materials require chilling to form the final product. Obviously, when one considers the fact that in many cases only a few degrees of temperature separate the desired range of thermoplasticity from the range of vulcanization, the injection molding of thermosetting materials such as rubber is infinitely more difficult to perform and to control than the molding of thermoplastic materials.

The diversity of rubber and plastic materials now in use has led to the development of several molding systems and each system is particularly adapted to certain types of materials. There are four basic methods of forming rubber compositions:

1. Compression molding.
2. Transfer molding.
3. Continuous extrusion.
4. Injection molding.

Compression molding and transfer molding are generally used with thermosetting plastics, rubber, synthetic rubber and brake lining compounds. These materials, as well as thermoplastics, may be formed into continuous lengths by an extrusion process; but, with the exception of thermoplastics, these materials must be heated after extrusion in order to "cure" or "set" them. The injection molding process is used almost exclusively with thermoplastic materials. For the benefit of those not completely familiar with all these methods, they are reviewed briefly with the thought that such a review may simplify the discussion of the Chrysler Rubber Injection Molding Machine.

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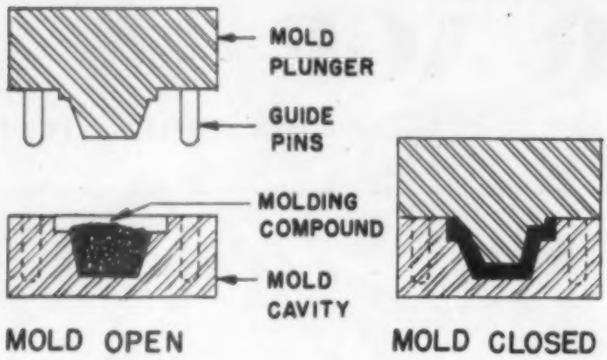


FIG. 1—Compression Molding Process.

Compression Molding

Hydraulic and/or mechanical toggle presses are used to exert the great pressures required for the compression molding of thermosetting plastics, rubber, synthetic rubber, and brake lining compounds. As shown in Fig. 1, the material is placed in one section of the mold and the press forces the movable member of the mold to compress the cold molding powder or amorphous rubber into the required shape. The mold is capable of being heated or kept hot by means of built-in electrical heating elements or by means of channels through which hot oil, hot water, or steam may be circulated or, as is the usual practice, by conduction from the heated platens. This combination of heat and pressure completes the chemical reaction while the mass of molding compound is held under pressure in the mold.

Once the chemical reaction has taken place the pressure may be released and the mold opened. The finished product while still hot is then removed from the mold. The time of this chemical reaction or "cure" varies from a few minutes to several hours, depending on the volume of the material in the molded part and the type of compound used. Since this method of molding is relatively slow, multiple cavity molds are used so that each molding cycle will produce a relatively large number of pieces.

Thermoplastics and certain types of Thiokol synthetic rubber are sometimes molded by the compression process. With these materials, the mold is heated while in the press until the compound softens and flows to fill out the cavity. The mold is then cooled below the softening point of the compound and the product removed.

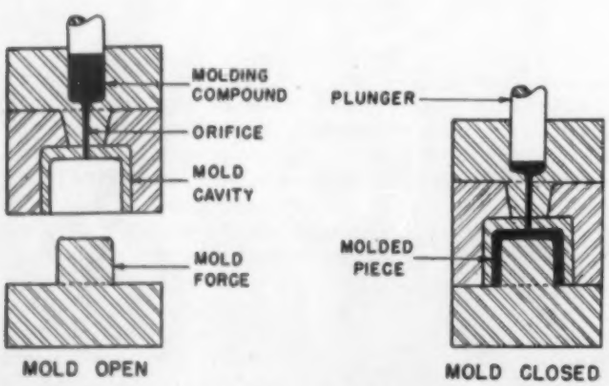


FIG. 2—Transfer Molding Process.

Transfer Molding

In the transfer molding process (Fig. 2), the molding material is compressed in a cylinder which is a part of the mold and then transferred through a small orifice from this cylinder to the mold cavity. When the press closes the plunger of the cylinder exerts pressure on the molding material. Under the influence of heat and pressure the material becomes sufficiently fluid or plastic so that it is forced through the orifice into the mold cavity to form the final product. When the proper density of compound is reached in the mold cavity section, no more material can flow in. The pressure is then maintained until cure has taken place. This process was originally developed to facilitate the molding of intricate thermosetting plastic parts and recently has been applied to the molding of rubber and synthetic rubber with considerable success.

Continuous Extrusion

Thermoplastic plastics, rubber, synthetic rubber and brake lining compounds may be forced through a die to produce continuous lengths of various cross-sectional shapes by the method shown in Fig. 3. The extrusion machine operates very much like a sausage grinder, forcing the plastic material through the die which controls the shape of the extruded product. After passing through the die a thermoplastic material must be cooled so that it will harden and retain its shape. Rubber, synthetic rubber, and brake lining materials must be cured by a heat treatment after extrusion; they emerge from the die in a semi-plastic state, yet are rigid enough to retain their shape until cured.

Injection Molding

The injection molding process is similar to transfer molding in many respects. This system was originally used for thermoplastics; but with the recent development of the "Jet Injection Molding Process," thermosetting plastics and rubbers have been experimentally injection molded. In the injection molding process, the molding material is heated in a pressure cylinder, as shown in Fig. 4. The material, in the plastic state, is then forced or injected by means of a piston and cylinder arrangement through a nozzle into the mold cavity. When using thermosetting materials the mold is cooled by circulating water or air. This relatively

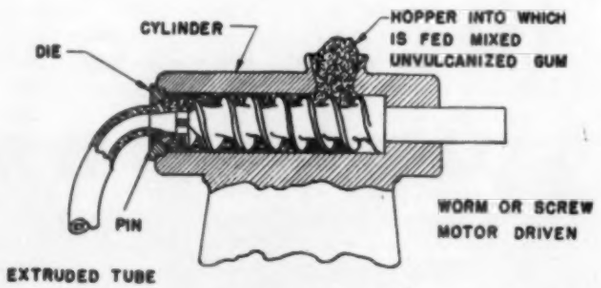


FIG. 3—Extrusion Molding Process.

cold mold chills the hot material and after sufficient time has elapsed to cool the material below the plastic or fluid stage, the die is opened and the final product pushed out of the mold by ejector pins. Since the parts may be chilled very rapidly the molding cycle is very short—usually less than two minutes.

Many experiments have been made with devices and machines designed to fill or stuff mold cavities with rubber through small channels or orifices. (Hereafter the term "rubber" is meant to include unvulcanized natural and synthetic rubber compounds). The Chrysler injection molding process is, we believe, the first commercial process developed for the actual injection molding of rubber. By "injection molding" is meant the ability to fill completely the cavities of a closed mold through a small orifice and to complete the vulcanization of the compound in a relatively short space of time.

The injection molding process described in this article was invented by Walter P. Cousino of the Chrysler Corporation and is protected by numerous patent applications. The basic principle of the Chrysler Injection Molding Process is simple, the injection head functioning in a manner similar to a rubber extruder or tuber, with such modifications of design as to allow tremendous injection or extrusion pressures to be developed. The rubber emerging from the nozzle of the head is injected or extruded into a hot mold where vulcanization takes place.

The basic difference between this process and the conventional injection molding process previously mentioned is that the Chrysler machine uses a special screw to develop injection pressures while the latter uses a plunger-cylinder mechanism. One advantage of the screw machine is that it is capable of producing a continuous pressure-volume flow, whereas the plunger type injection machine can only produce a limited volume flow depending on the length of the stroke and the diameter of the plunger. From a practical viewpoint this means that the screw machine can fill molds with very large cavities and therefore produce exceptionally large parts or extrude indefinitely long sections of rubber in contrast to the plunger machine where the size of the product or the length of the extruded part is definitely limited.

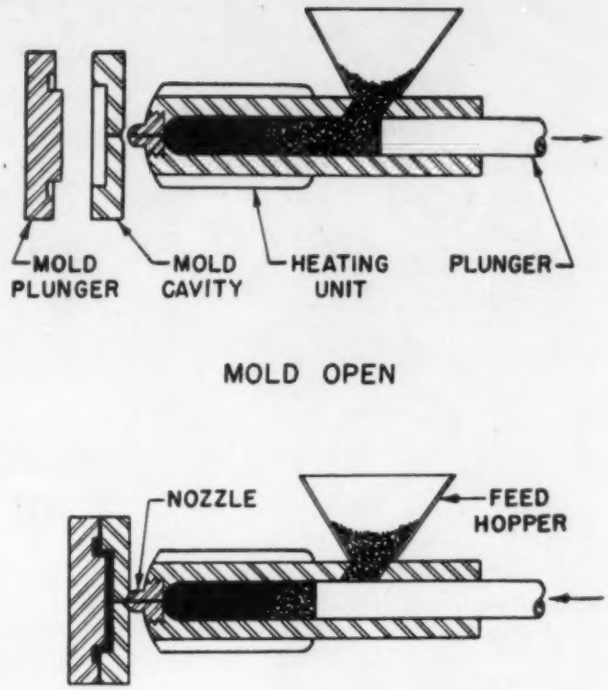


FIG. 4—Injection Molding Process.

A simple analogy may be made to a meat grinder and tube of toothpaste in order to describe the difference in the two processes. The meat grinder, which contains a screw mechanism, will continue to extrude as long as material is fed into the hopper of the grinder. Once the tube of toothpaste is empty and rolled up it must be refilled before additional material may be extruded from it.

The Chrysler Rubber Injection Molding Machine is divided into two sections: (a) the Injection Head,

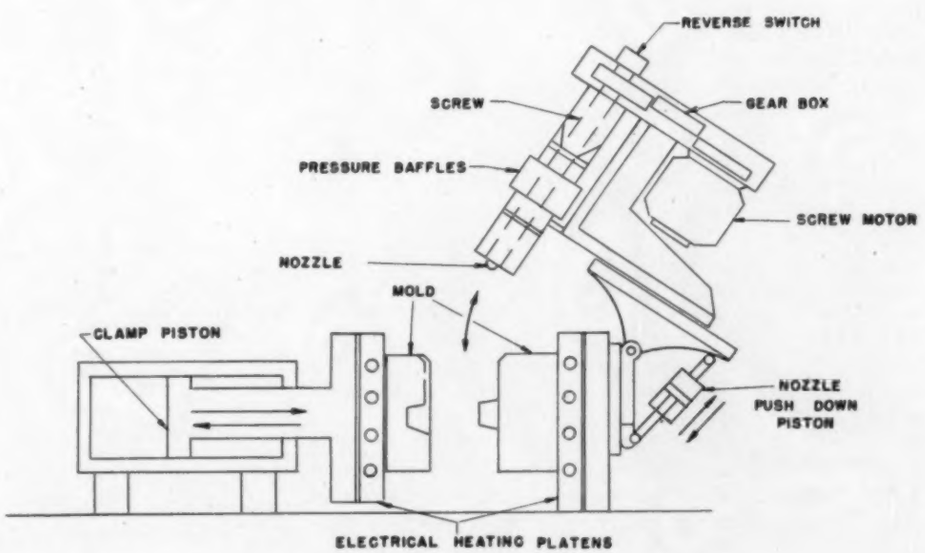


FIG. 5—Chrysler Rubber Injection Machine: Mold open, nozzle up.

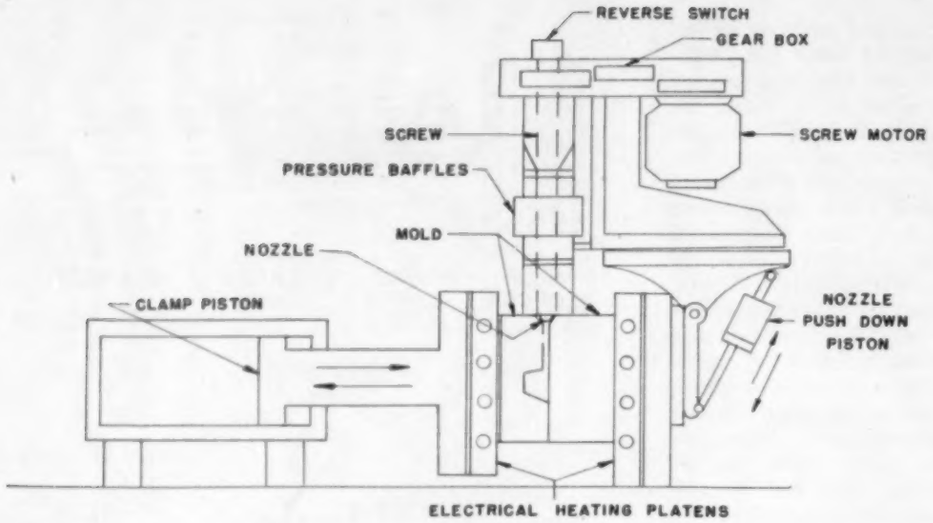


FIG. 6—Chrysler Rubber Injection Machine: Mold closed, nozzle down.

which contains the screw and produces the injection pressure, and (b) the Mold Clamp or Press, which holds the mold or die together during the filling and curing operations.

The Injection Head

The injection head is attached to the clamp or press as shown in Fig. 5, the "head" assembly being pivoted on the stationary end of the mold clamp. When the head is in the vertical position, as shown in Fig. 6, the male nozzle engages a female cavity which is part of the sprue of the mold. The mold is filled through a sprue, runners and gates which enter the cavities between each face of the mold. In conventional methods of injection molding, the sprue enters the mold through the center of the mold face. The head is actuated to engage the nozzle with the mold by means of a hydraulic cylinder. The pressure pushing the nozzle down approximates 6000 pounds total, but is not as great as the injection or filling pressure of the rubber entering the mold. The head or injection mechanism which is shown schematically in Fig. 7, may be considered as being divided into three sections: (A) Driving Mechanism; (B) Screw, Baffle and Pressure Chamber; and (C) Nozzle Section.

(A) Driving Mechanism: The driving mechanism consists of a 10 h.p. high torque electric motor and a train of four gears which rotate the extruding screw. This assembly is an integral part of the injection head that pivots on the mold clamp. Fig. 8 shows a view of the driving mechanism used on the original experimental injection head. By changing gears, screw speeds from 80 to 150 rpm are obtained. In most of the experimental and production injection work with rubber, a screw speed of 125 rpm has been used. It has been found desirable to vary the speed for different synthetics, and this may be accomplished by a variable speed unit or by replacing the high torque motor with a hydraulic motor.

(B) Screw, Baffle and Pressure Chamber: The screw chamber and baffle gear housing fits directly below the drive shaft of the gear train, as shown in Fig. 7. The screw chamber or pressure section contains the feed screw which meshes with a pair of free running baffle gears in a manner similar to a worm gear drive.

The rubber, in strip, ribbon, or rod form, is fed into the feed hole of the injection head, where it is passed through a barrel by the feed screw in much the same manner as in a conventional extruder or tuber. Near the mid-point of the screw, the profile of the thread changes so that its cross section there resembles that of an Acme thread. At this section are located the

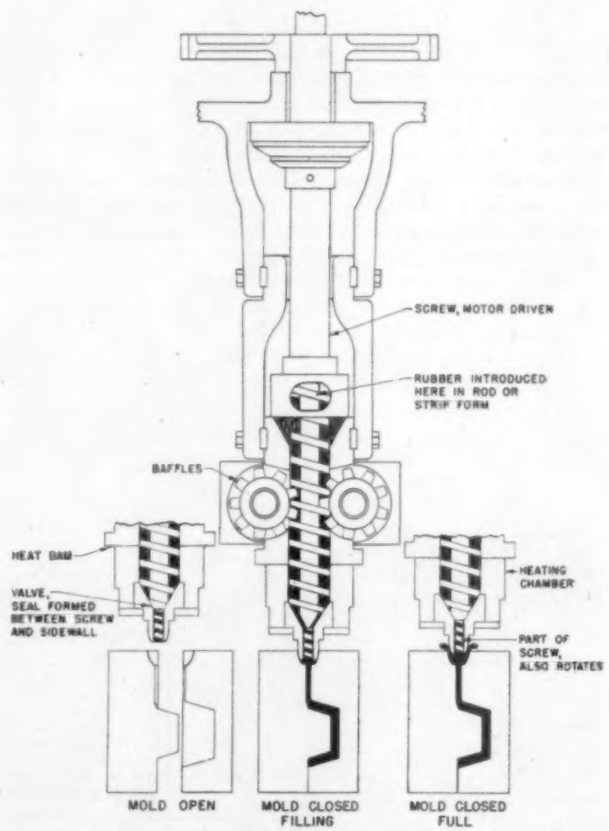


FIG. 7—Head or injection mechanism.

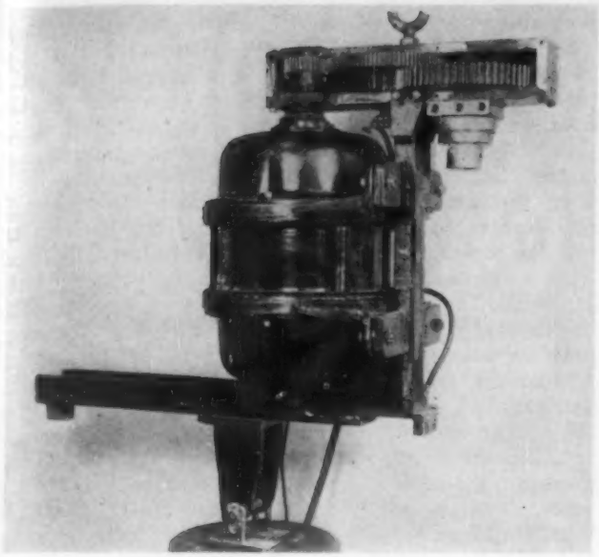


FIG. 8—View of the driving mechanism used on the original experimental injection head.

specially designed baffle gears. Below the baffle gears the cross section of the thread changes so that it is similar to the thread cross section of the other side of the baffle gears. The thread terminates at and blends into the end of the screw where the nozzle is located. Between the baffle gears and the nozzle the screw has a constant lead and the major diameter of the screw is such that only a small clearance is left between the edge of the thread and the barrel. The housing containing the baffle gears is provided with a cooling jacket through which cold water is circulated. The major diameter of the screw is approximately 2 inches; the working length 12 inches. Fig. 9 shows the screw chamber components completely disassembled.

The baffle gears used in this section of the machine act as pressure locks and are the means of producing the extremely high injection pressures in the screw chamber below the baffle gears. Their function is two-fold—to prevent the rubber from turning with the screw and to prevent the rubber from backing up into the feed section. The screw section above the baffle gears merely feeds the rubber to the pressure section. With conventional rubber extruders, the highest pressure developed is believed to be in the neighborhood of 1800 to 2000 psi, but by the Chrysler method using baffle gears pressures as high as 22,000 psi have been recorded.

(C) Nozzle Section: After leaving the screw chamber, the rubber is forced into the nozzle section which decreases in diameter from the diameter of the screw chamber to the diameter of the nozzle, or from 2 inches to 7/16 in. inside diameter.

The nozzle section and its relation to the screw and mold is very important for the correct functioning of the machine. A photograph of an experimental, but typical, nozzle section is shown in Fig. 10. In Fig. 7 the nozzle section is attached to the screw chamber and it will be noticed that a small auxiliary screw is attached to the end of the main screw and extends to the bottom of the actual nozzle, which is 7/16 in. I.D. The diameter of this flat-pitch auxiliary screw which

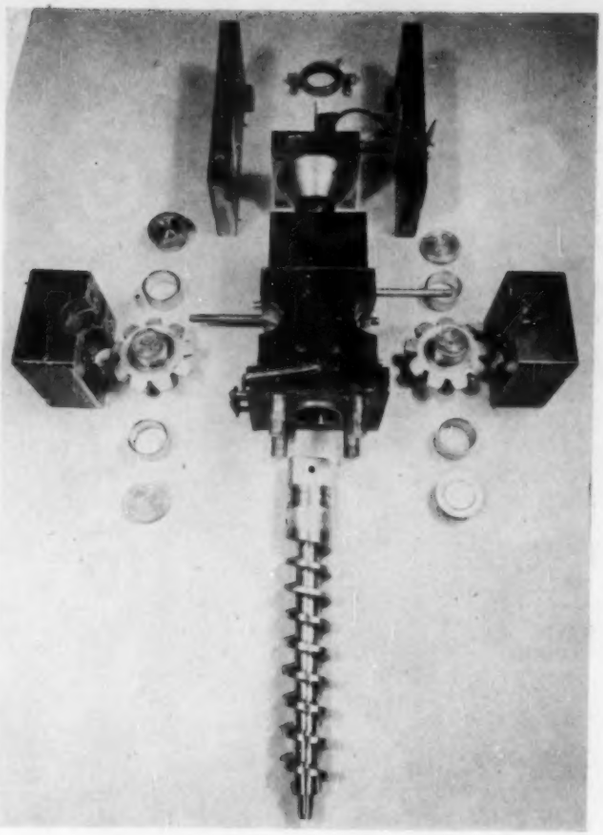


FIG. 9—Screw chamber components disassembled.

rotates with the main screw is 5/16 in. This leaves a space between the auxiliary screw and nozzle wall of 1/16 in. so that the rubber is extruded out of the nozzle in the form of a tube, 7/16 in. O.D. with 1/16 in. wall thickness.

The main reason for this unique construction is to develop additional frictional heat when required. It should be noted at this point that the rubber used in the machine requires no additional pre-heating other than that obtained mechanically by friction in the screw chamber and nozzle section. The small nozzle

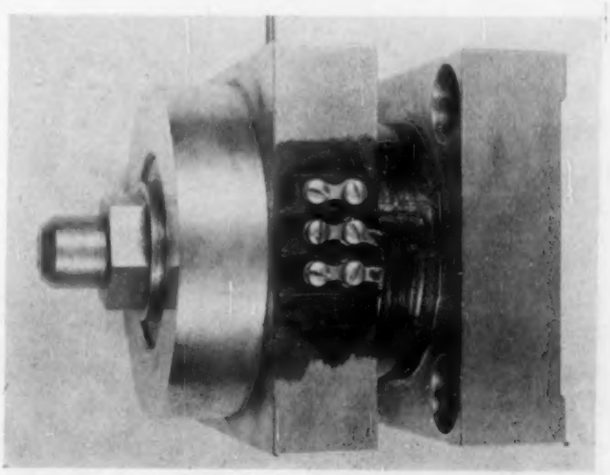


FIG. 10—Experimental, but typical, nozzle section.

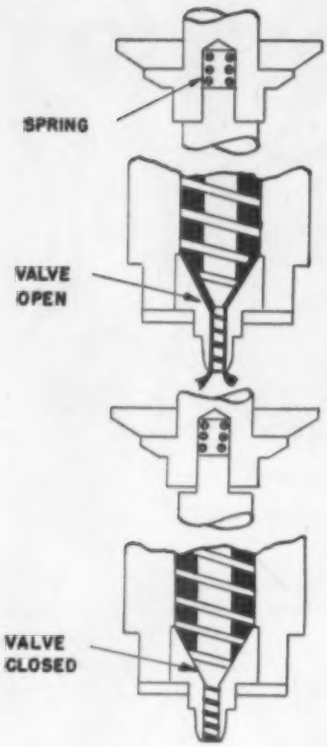


FIG. 11—The upper part of this drawing shows the valve in the open position when the screw is rotating.

section develops extreme frictional heat due to the thin section that the rubber must pass through at high speeds and pressure and also due to the fact that the auxiliary screw is rotating and slipping on the rubber being extruded.

Frictional heat, when rubber is passing through the screw chamber, may develop temperatures as high as 300°F. in the rubber and this accounts for the rapid curing cycles. The question then arises as to the possibility of the rubber "setting up" in the nozzle. This is not experienced as the frictional heat is developed only when the screw is in operation and the mold is filling. The thin section of rubber in the nozzle cools quickly due to heat dissipation by radiation through the upper part of the aforementioned nozzle chamber.

In the nozzle section there is also an automatic check valve to prevent the rubber from backing up into the screw chamber from the mold after it is filled. This valve seal is formed between the bottom of the screw and the inside tapered section of the nozzle. The upper part of Fig. 11 shows the valve in the open position when the screw is rotating. Due to reaction against the rubber, the screw pushes away from its seat on the conical nozzle, thus creating a passage for the rubber to flow out into the mold.

When the screw stops rotating and ceases to create pressure, the spring at the top of the screw pushes the screw down against the conical section of the nozzle, thus forming a seal as shown in the lower part of Fig. 11. By this unique action the valve is only open when the screw is rotating. In practice the nozzle is held against the mold for a short period of time after filling until the sprue in the mold partially vulcanizes and forms a "sprue lock" which retains pressure on the rubber in the mold. After formation of the "sprue lock" the injection head is swung back from the mold, allowing the nozzle to cool by means of radiation between cycles.

It was found from previous experiments that the pressure below the baffle section should be reduced when the screw is idle during the curing cycle. If the rubber were allowed to remain under pressure in the screw section below the baffle gears, it would tend to ooze into the baffle gear housing and clog the gears. At the extremely high pressures and elevated temperatures used the rubber would then set-up so that the next time the screw was rotated the

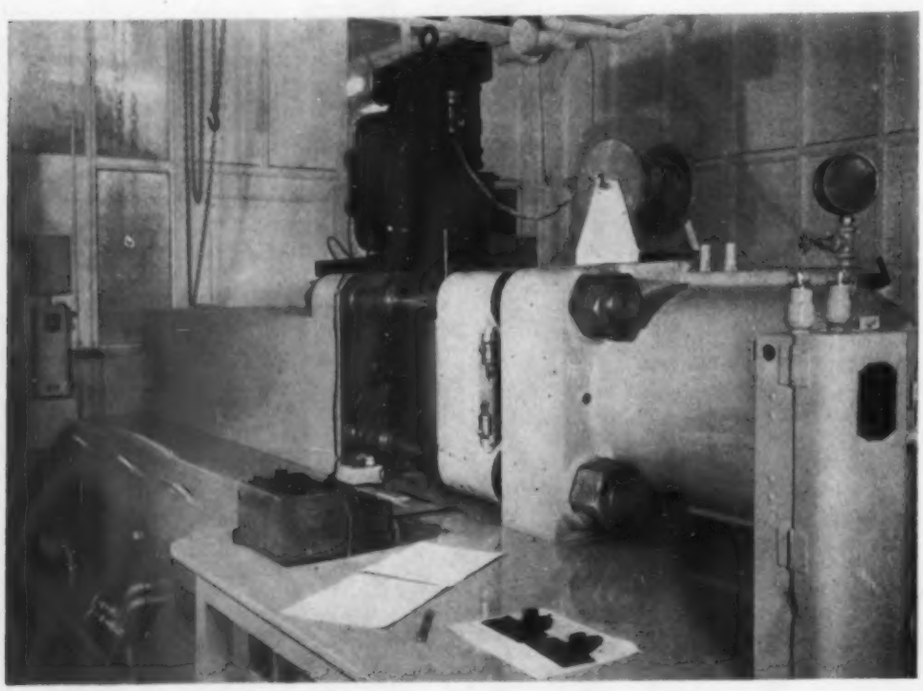
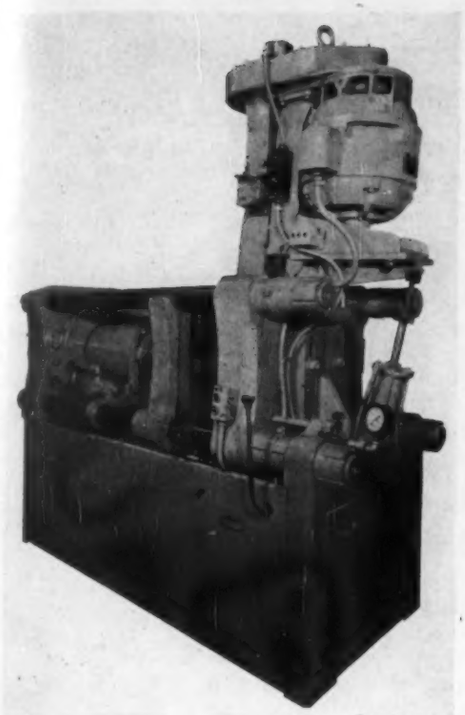
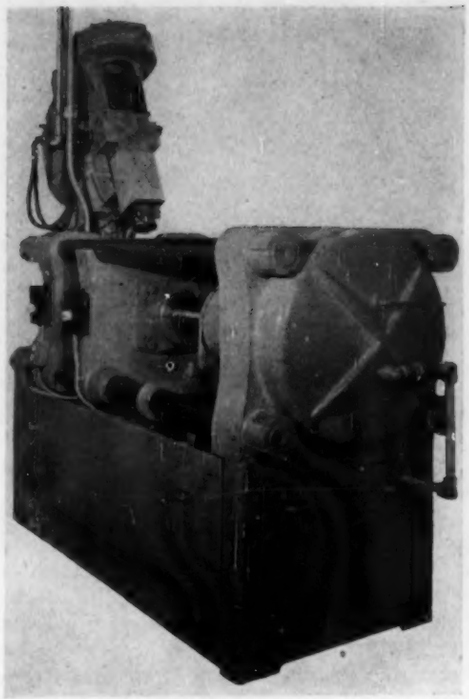


FIG. 12: View of the original Rubber Injection Machine which was in operation at the Chrysler Engineering Laboratories.





FIGS. 13 (left) and 14 (right) show front and rear views, respectively, of the first Rubber Injection Machine operating in production.

baffle gears would jam, the motor stall, and the screw probably break. Accordingly, the machine is now designed so that the screw automatically reverses 1½ turns immediately after the mold is filled in order to relieve the pressure in the screw chamber while still retaining pressure on the rubber in the mold by the action of the valve just described.

The Mold Clamp or Press

The second component of the Chrysler Injection Process is the Mold Clamp or Press. Any type of mold clamp may be used provided that it is capable of exerting a minimum pressure of 6000 psi on the free rubber surface at the parting line of the mold. The total clamping pressure on molds up to 20 x 20 inches in surface face area will vary from 200 to 500 tons. This clamping pressure, while common to the plastics industry, is greatly in excess of pressures commonly used in the rubber industry for similar sized platens.

High capacity clamps are essential because the injection pressure is so high that molds in average capacity presses would be spread during filling, resulting in "flash" on the products and loss of quality. The platens may either be horizontally or vertically opening. Horizontally opening platens are preferred since this permits rapid mold changes when self-stripping molds are used, but vertically opening platens are usually necessary when molding products containing metal inserts.

The platens may be heated by any convenient means, but in order to achieve rapid curing cycles high temperatures are needed, and the use of electrically-heated platens is indicated. Since the mold is bolted directly to the hot platens and since the rubber is almost at the curing temperature when entering the mold, electric current consumption is very modest.

Fig. 12 shows the original Rubber Injection Machine which was in operation at the Chrysler Engineering Laboratories. The injection head was attached to a standard 200 ton mold clamp. Figs. 13 and 14 show front and rear views of the first production machine now in operation. The clamp used on this machine was designed by Mr. Cousino and is capable of exerting a pressure of 200 tons. Fig. 15 shows the latest

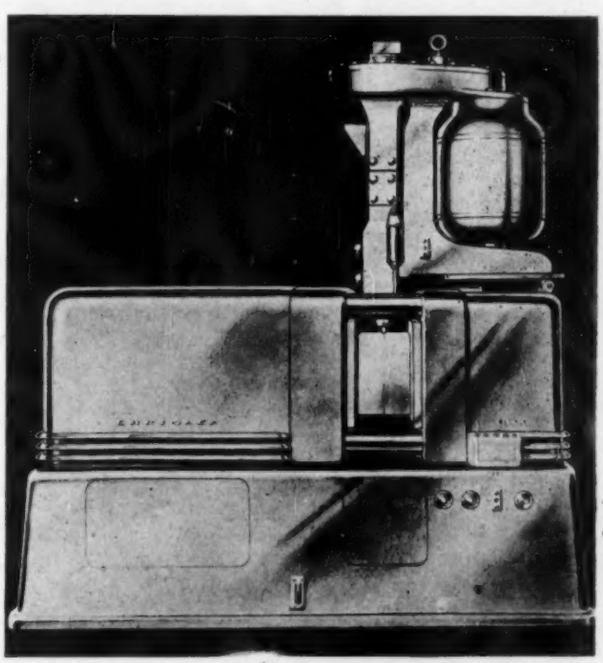


FIG. 15—Latest design of the Chrysler Rubber Injection Machine which is provided with a 450-ton mold clamp.

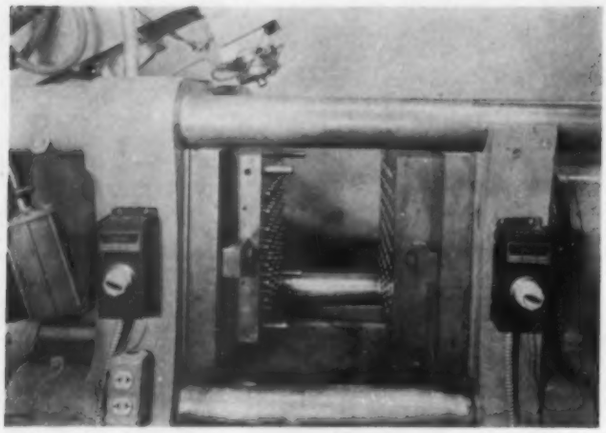


FIG. 16—View of production machine showing the injection head in the "up" position with nozzle removed from the open mold.

design of the Chrysler Rubber Injection Molding Machine which is provided with a 450-ton mold clamp and which will be ready for 1945 production. This machine is self-contained with the exception of electric power and cold water sources. Two 10 h.p. motors and two banks of electric heaters having a total capacity of 15,000 watts are required. The machine occupies a floor space of 3 x 9 feet.

Operates on Automatic Cycle

The Chrysler Rubber Injection Molding Machine is designed to operate on an automatic cycle. A detailed description of a complete cycle will reveal the action and function of the various components of the machine. Starting with the mold open and nozzle up, the electrical controls are set for "automatic" and a button is pressed which starts the pump of the hydraulic system. (Fig. 16 is a photograph of a 200-ton Chrysler Rubber Injection Molding machine now being operated in production. This view shows the injection head in the "up" position with the nozzle removed from the open mold. Fig. 17 is a photograph of the same machine with the mold closed and the nozzle in the injecting position).

The operating button is now pressed, starting the machine on the automatic molding cycle. First the bolster plates of the mold clamp, to which are bolted electrically-heated platens and the mold halves, come together, closing the mold. When the hydraulic pressure on the mold clamp reaches the required magnitude a pressure switch activates a solenoid valve which applies hydraulic pressure to the cylinder pushing the head "down." When the nozzle is firmly placed in the mold sprue a micro-switch starts the drive motor, rotating the screw and feeding the rubber through the screw chamber into the mold. The rubber, in strip or rod form, is fed into the injection head through the feed hole, as shown in Fig. 18.

When the screw starts, the reaction against the rubber overcomes the spring load holding the screw against the valve seat in the nozzle chamber and causes the screw to lift. This opens a passageway between the bottom of the screw and the inside of the nozzle, allowing the rubber to flow into the mold. During this process, the section around the baffles is kept at about 70°F. by cooling water. The rubber below the baffles, however, reaches about 160° to 180°F. due to frictional heat generated by slippage of the rubber on the screw. When the rubber passes by the auxiliary screw in the nozzle, friction causes the temperature of the rubber to rise to around 280° to 300°F. Thus, when the rubber reaches the mold, it is almost at the temperature of the mold itself.

When the mold is filled—which takes from two to forty-five seconds, depending upon the volume and type of mold being filled—the pressure in the mold becomes so great that the rubber backs up and a small amount overflows between the nozzle and female nozzle seat. In doing this, the overflow overcomes the combined weight of the head and the pressure of the push down cylinder, thus raising the head a fraction of an inch. In turn, this movement of the head activates a micro-switch which stops the rotation of the screw and the feeeding of rubber into the mold. As the screw has stopped exerting pressure against the rubber in the screw chamber the spring in the top section of the screw pushes it down against the valve seat on the inside of the nozzle section. This forms a seal preventing the rubber from backing out of the mold.

At the same time a relay system reverses the screw 1½ turns to relieve pressure on the rubber in the screw chamber, thus preventing it from clogging the baffles. The fact that there is a pressure lock between the screw and nozzle prevents the screw from pulling the rubber out of the mold when it reverses. When the head motor is stopped, two interval timers are automatically started. One timer controls the time the nozzle remains against the rubber in the mold; the other determines the time the mold is closed, that is, the actual curing period of the rubber.

The nozzle is held against the rubber in the mold sprue for fifteen to thirty seconds. The small layer of overflow rubber lying between the nozzle and the mold acts as a heat insulator and tends to prevent the rubber in the nozzle from setting up because of nozzle contact with the extremely hot mold during the "hold down" period. The hold down period is long enough to allow the rubber to partially cure in the thin section of the sprue in the hot mold; accordingly, this

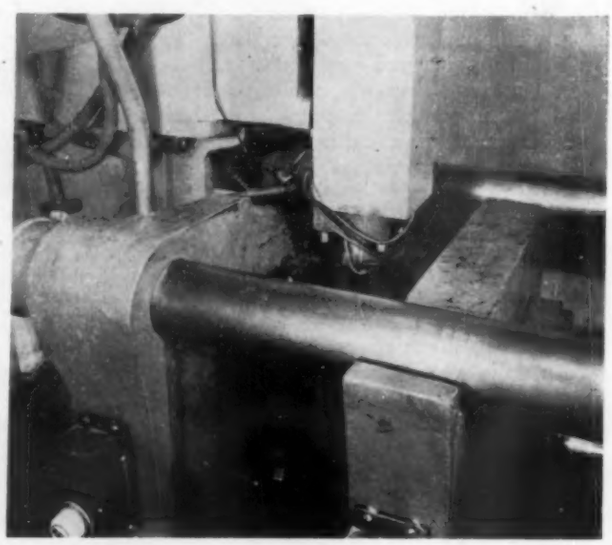


FIG. 17—View of the same machine as in Fig. 16 with mold closed and the nozzle in injecting position.

semi-cured section acts as a lock, retaining pressure when the nozzle is removed and holding the rubber in the mold under this pressure during the remainder of the cure.

At the end of the hold down period, the first timer activates the push down cylinder solenoid so that the cylinder swings the head up and away from the mold. This is done to get the rubber in the screw chamber and nozzle as far away as possible from the hot mold to prevent setting up the rubber in these sections.

The temperature of the mold and time of cure vary, of course, for different rubber compounds and for different products. During most of the experimental work at Chrysler, the mold temperature was 360°F. and the curing time was one to two minutes. The present production cure with neoprene, for instance, is 3 minutes at 350°F. At the end of the curing time the second timer activates a valve which opens the mold so the parts are ready for removal.

The operation described is entirely automatic and commences when the operator pushes the button to start the cycle. During the cycle, the operator is free to start operations on other machines or to rough trim the products from the preceding cycle.

Quality of Products

All types of natural and synthetic rubbers have been injection molded, and all appear to be adaptable to this process. In general, routine compounding practices are observed. There is no need for highly accelerated compounds. In fact, compounds containing the so-called "slow" accelerators appear to give the best over-all results. Fig. 19 shows some of the rubber and thermosetting plastics parts which have been molded by this process.

The high pressure used in the injection molding process apparently consolidates the rubber and the denser product obtained has better physical properties than when molded by conventional methods. In a recent set of experiments the properties of a series of neoprene compounds from 30 to 90 Durometer hardness were investigated and compared with the properties of the same compounds when compression molded in a laboratory press. It was found that the compounds injection molded 1 min. at 360°F. had the same properties as when compression molded 30 min. at 307°F. Injection molding 3 min. at 360°F. yielded physical properties 15 to 25 percent better than the compression molded samples. Because the rubber enters the closed mold in a turbulent manner, laminations, strain lines, and stresses caused by flash or overflow in conventionally molded items are absent in injection molded products. This advantage is difficult to demonstrate by conventional laboratory tests, but may be capable of demonstration in actual service tests on products such as diaphragms, etc.

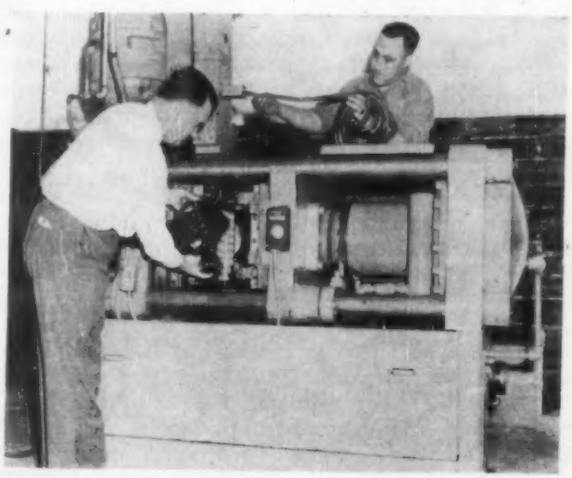


FIG. 18—Rubber, in strip or rod form, being fed into the injection head through the feed hole.

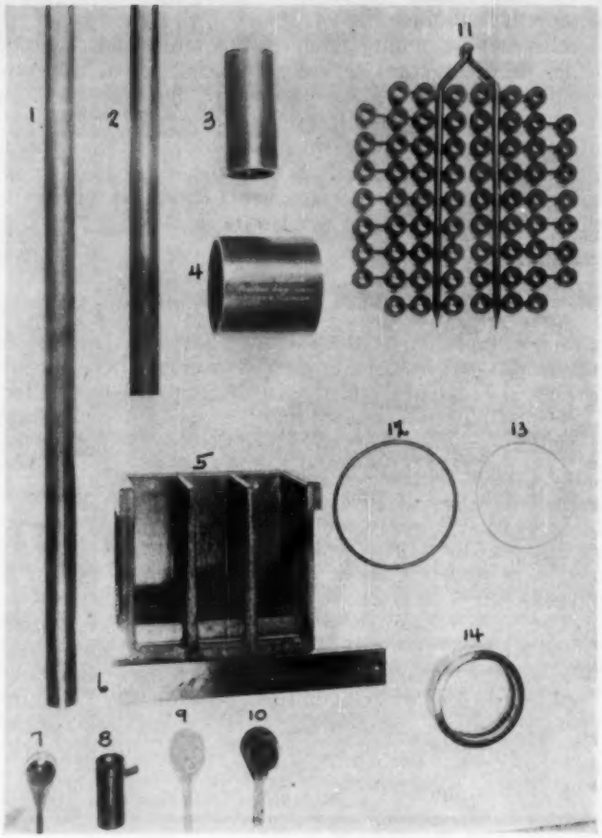


FIG. 19—Some of the rubber and thermosetting plastics parts which have been molded by the new injection molding process.

With modern electronic controllers the platen heat may be controlled very accurately so that, in conjunction with automatic timing devices, non-uniformity of cures should be a thing of the past. In addition to this, the physical qualities of products molded by the injection process vary but little from cavity to cavity. Compression set and tensile strength tests made on identical products cured in a 68 cavity mold showed the small variation from cavity to cavity to be within experimental error.

The most outstanding and apparent advantages of the injection molding process are the high production capacity and the reduction in labor costs. Feed stock may be removed by strip knives from the warm-up or sheet-off mills and fed into the injection head, thus eliminating stock preparation labor and operations. If desired, rubber in strip form may be used directly from storage without warm-up or plasticization since the action of the screw serves this purpose. Loading

boxes and similar devices for charging the mold are completely eliminated.

Although trimming labor is not entirely eliminated it is, in most cases, greatly reduced. With accurate molds and sufficient clamp capacity, flash or overflow is absent, so that trimming consists of merely removing the gates from the finished product. This operation may be satisfactorily accomplished by hand trimming or by a punch or beam press equipped with gang dies.

Number of Rejects Reduced

When molding by the injection process the number of defective products is greatly reduced since when the mold is properly bled, air blistering, back-rinding, and lamination troubles may be avoided. The high injection pressures employed ensure knitting of the driest stocks. Molds in which the stock must travel a long distance or around intricate inserts usually present trouble in normal production but are readily adapted to the injection process. Since the injection process produces higher quality vulcanizates, lower cost compounds may be used to meet a given specification.

The very rapid over-all molding cycles may be best illustrated by the following actual and typical case: The product was a shock absorber oscillating-pivot bushing molded from a normal high quality 60 Durometer neoprene compound. The bushing was roughly cylindrical in shape, ¾ in. high x 1¼ in. O.D. x ⅝ in. I.D. The bushing was molded in a 102-cavity mold equipped with a stripper plate. The mold, including runners and sprue, was filled on the average in 35 seconds, requiring 2¾ lbs. of stock. A production cure of 3 min. at 350°F. was used with an over-all cycle averaging approximately 4 min. Thus the mold was turned over 15 times each hour with an hourly productivity somewhat greater than 1500 units. The total scrap including products damaged in trimming averaged 12%.

Inasmuch as one press operator can readily operate two machines and more and because no stock preparation labor is involved, no comparison is necessary with respect to the saving in labor costs by the injection molding process.

Reduction in Labor Costs

By all present indications labor rates in the post war era will be at least the equal of present rates and probably will be greater. From the viewpoint of management it is imperative to reduce labor costs by increasing labor efficiency. It is believed that apart from other considerations, injection molding presses offer a definite incentive to management as a means of increasing labor efficiency and consequently reducing over-all labor costs in the production of items in the molded mechanical goods field.

Hevea Rubber Plantations in Colombia

MUCH progress has been made on the program to develop demonstration Hevea rubber plantations in Colombia, a joint undertaking of the United States and Colombian governments. A total of 1,000 acres had been cleared and 450 acres planted by the middle of October. It is estimated that by the end of 1944, 1,000 acres will have been planted, and authoritative sources are confident that the rate of progress will be greatly accelerated in 1945. Work has progressed despite almost insurmountable difficulties.

This program was instituted in 1940, and in that year a survey party consisting of United States and Colombian technicians carried out extensive studies in the central, western, and northwestern parts of Colombia, to determine which areas might be suitable for Hevea rubber plantations. Following the field reconnaissance, an agreement pertaining to further cooperative work in establishing a rubber plantation industry was drawn up and signed by representatives of the respective Governments of the United States and Colombia.

The principal provisions of this agreement related to collection of Hevea seeds, cultivation and testing of seedlings, furnishing of land, labor, and technical aid, and releasing of data based on experiments. One important point also covered was that redistribution was to be restricted to agencies and governments of the Western Hemisphere on a reciprocal basis. A supplementary memorandum to the agreement, signed in 1943, provided for the establishment in the best rubber-growing areas of the country of three central plantations of 1,250 acres each for actual field plantings which might serve as demonstration and propagation centers in the program of plantation development.

As a result of the 1943 agreement, nurseries were established at Acandi, Turbo, Rio Grande, Apartado, and Villa Arteaga, and a small quarantine nursery was started at Palmira Experiment Station. Work is going forward at each of these locations, the major progress having been made at Acandi, Turbo, and Villa Arteaga. Future developments will be concentrated at Villa Arteaga, which will be technical headquarters of the rubber plantation program. Plans call for the immediate construction of modest housing units and office quarters at that location. Technicians will go out from there to supervise activities on the several other plantations.

Among the many difficulties that faced the promoters of the program were lack of roads and inadequacy of transportation facilities. Selection of sites of plantations was based on suitability of soil for rubber cultivation, and, in the case of several locations, the technicians had to go many miles by motor launch, on muleback, or on foot. Health and living conditions were generally unfavorable, and in places where there was no skilled labor available, the technicians had to train workers. Directors of the program are confident that the work will go forward much more rapidly after new living quarters for the staff are built and certain sections of roadways are completed.

A Post-War Standardization Plan for the Plantation Rubber Industry

By F. D. ASCOLI

Managing Director, Dunlop Plantations, Ltd., London, England

The author of this article is one of the foremost authorities on crude rubber. In the accompanying article he advances a plan for divorcing the manufacturing end from the growing end of the plantation industry, thus permitting large-scale standardization of crude rubber grades. To accomplish such standardization, he recommends reduction of the number of grades from the 40-odd available prior to the war to approximately 6 in the post-war period. Comment on the plan is invited.—Editor.

MUCH has been written regarding the necessity of preparing for the post-war export trade of England. The problems of British overseas industries are perhaps of little less importance. Among these one of the most vital is the rubber plantation industry. With the occupation by the Japanese of Malaya, Burma, British North Borneo and Sarawak, complete reconstruction will be necessary in 85 percent of the rubber planted area of the British Empire; in the Dutch possessions reconstruction will be necessary throughout.

It seems right at this stage to consider what lines reorganization should follow and how far past practice should be modified to adapt the industry to meet new conditions resulting from war-time developments. For during the war two new classes of materials, complementary in their uses to crude rubber, have been developed—plastics and synthetic rubbers. The problems connected with these new materials suggest that, in the process of reorganization, the rubber plantation industry should consider what modifications may be necessary in the growth of its product and in its preparation for use by the consumer.

Current Organization of Industry

The organization of the rubber plantation industry has been subject to considerable criticism on account of the smallness of the average unit into which it is divided. From the actual *growing* point of view, I doubt if this criticism is generally justifiable—especially in view of the fact that half of the industry is in the hands of smallholders. Rubber can be grown as efficiently in a small unit as over extensive areas.

There is no reason to believe at present that the method of growing in any way affects the quality of the rubber produced, though such control of quality may be possible in the future. If the shareholder in a small company is prepared to bear the cost of higher overheads, that is really his own business. If the small unit is unable to finance upkeep and new planting on the most up-to-date scientific lines, that again is its own loss—the quality of the product is not affected. But it must not use that argument for insisting on a high price for the commodity.

In practice, the planting of high-yielding stock has been largely the prerogative of the larger and financially stronger units. If the industry is organized on lines which do not encourage the most economical form of production, the loss falls on the industry itself and not on those who require its products. I know of no general application of a law to enforce up-to-date scientific methods of growing on any agricultural product.

Grades on Pre-War Market

But growing is not the sole function of the rubber plantation industry. It also prepares its product for the market—probably following the example of the tea industry. One might on the other hand ask why the small wheat grower does not produce his own flour, or the beet grower his own sugar. Rubber as obtained from the tree varies vastly in character; there is no uniformity in the product of each unit or holding. The number of grades on the market amounted in pre-war days to more than forty. Even within the grade of standard ribbed smoked sheet there is no standard of quality but only that of comparative cleanliness and appearance.

Not fifty percent of the total output fetches the standard market price, partly due to methods of preparation, partly to presence of dirt. Discounts ran to 1d. or more per lb. for off-qualities. One-eighth of a penny per lb. represents the sum of over £1,000,000, on the annual output of British Empire producers alone. Such loss of profit could be avoided and it at least suggests the advisability of considering revised methods of manufacture, even if they involve some additional cost to the industry.

For the variety of grades the producer alone is not responsible: the manufacturer has accepted them with little complaint; the market has encouraged them as they increase trading possibilities. But what the manufacturer requires is uniformity and cleanliness, and it must be the function of the market to adapt itself to the mutual interests of producers and users.

The present war has given an unrivalled opportunity

to reorganize this side of the plantation industry. It is assumed that practically all the manufacturing equipment in the occupied areas will require replacement. The tools of the smallholder consisted at the best of hand mangles; the tools of many of the larger units were little better than mechanized mangles. The method of manufacture has not materially changed in the last forty years. There is scarcely an estate of a size sufficient to enable it to crepe its off-grades (*i.e.*, the rubber obtained in dry form) efficiently or economically; this can only be done by the use of heavy equipment operated by proper factory methods. It is a noteworthy fact that practically no rubber of special characteristics has been produced except by organizations with considerable financial resources which are only incidentally growers of rubber.

Decreased Efficiency Inevitable

It must further be recollected that with the increased use of Asiatic supervision (which is inevitable) there must for several years at least be a considerable decrease in the efficiency of the vast number of small estate factories with consequent ill effects on former standards of uniformity and cleanliness.

It is a basic function of a producing industry to turn out its product in the best and most suitable form, as required by the consumer. This hypothecates in the case of rubber the highest standard of uniformity and the greatest possible degree of cleanliness. This must be the attitude of the crude rubber producing industry in its competition with synthetic rubbers.

I believe that this result is only possible by divorcing the manufacturing side of the industry from the actual growing side. This can be achieved by the institution of centralized factories, each dealing with the produce of large areas—with a minimum of 50,000 acres and possibly much larger. This would ensure avoidance of dirt and the maximum amount of uniformity by bulking latex in large quantities, by efficient methods of treatment and by adequate supervision. The cost of treatment would possibly show some increase which would be more than counterbalanced by the fact that the proportion of higher grades carrying the full standard price would be substantially raised.

Outline of Standardization Plan

This is not the place to enter into the details of such a scheme, but perhaps an outline would be of interest. Each centralized factory might be run on cooperative principles. It would purchase latex and off-grades from all estates and smallholders in its area at the same agreed prices (a great advantage to the smallholder). The problems of transport of latex and its temporary preservation in liquid form have already been solved by several large organizations. It would bulk the latex on a large scale and thus secure a large degree of uniformity. It would sheet the latex crop—possibly by a new continuous system, which would dispense with all manhandling and thus ensure cleanliness. It would be in a position to crepe off-grades economically on modern efficient equipment. Each factory would be under scientific and engineering control. It would sell the product, the profits on which would be shared by the participants.

It is not suggested that a scheme of this nature could be applied in identical form in areas so different geographically and economically as Malaya and Sumatra or Borneo. The incidence of smallholders and difficulties in transport systems might call for considerable local modifications. But the inherent object of the scheme—the substitution of haphazard and largely unsuitable methods of preparing plantation rubber by a system which would result in a uniform and clean product and which might reduce the number of grades of product from forty to five or six, each of known characteristics—is so vital to the future of the industry that I feel the subject to be one worthy of the fullest consideration.

If consideration is to be given to it, there is no time for delay. Reorganization of the industry will be necessary on the reoccupation of the territories now in the hands of the Japanese; re-equipment will also be necessary. It might be held that it would be safer to allow a scheme of such a far-reaching character to develop gradually on its own merits. But if the idea is held to be correct fundamentally is it not preferable that an attempt should be made to obtain the support and assistance of the governments concerned and that its development should be fostered by official recognition or even regulation? Priorities for new machinery will be necessary and these might be directed to the equipment of new regional centralized factories operated under a scheme approved by the government concerned.

Research Must Be Encouraged

It may be objected that the scheme is retrograde as it would tend to limit production to standard grades of rubber only. This is not the intention of the scheme. It must be the function of the producer firstly to meet the general demands of the consumer, which are likely to absorb at least 90 percent of the total output, and secondly to meet specialized requirements.

I do not believe that such specialized production can be developed without individual effort and research. Individual research must be encouraged and it could still be left to organizations employing scientific research staffs to devise and produce specialized grades of rubber, for the production of which they are adequately equipped. Whatever may be the future of such specialized production, that problem should not be allowed to influence or interfere with the broader problem of large-scale standardization.

"ANNUAL REPORTS" AVAILABLE

We are pleased to announce that we have received a new shipment of Vols. IV (1940), V (1941) and VI (1942) of the ANNUAL REPORT ON THE PROGRESS OF RUBBER TECHNOLOGY. These "Reports," issued by the Institution of the Rubber Industry (England), cover world-wide developments annually in all branches of the rubber industry. Vols. IV and V sell at $3.00 each; Vol. VI at $3.50. Address orders to

THE RUBBER AGE

250 West 57th St., New York 19, N. Y.

A Solution Method for the Compounding of Goldenrod Rubber

By FORREST L. McKENNON and J. RAYMOND LINDQUIST

*Southern Regional Research Laboratory, New Orleans, La.**

IN hevea, kok-sagyz, guayule and the stems of cryptostegia, rubber is present as latex in the laticiferous duct systems of the plants. These latex rubbers can be isolated in the form of relatively hard, nervy, non-sticky materials in which compounding ingredients are readily dispersed by milling.

In goldenrod and in the leaves of cryptostegia the rubber occurs in the form of isolated globules floating free among the plastids in the protoplasm of the palisade and spongy parenchyma cells, as shown in Fig. 1; occasionally three to five globules can be found in a single cell, but they usually occur singly, and average about 2 microns in diameter. Whether the rubber in these globules is in a solid or liquid state has not been determined, but it obviously cannot be isolated by bleeding. It is best obtained by solvent extraction of the dried, ground leaf material, and even after practically complete deresinification the rubber is soft and sticky and of too low plasticity for milling.

Recovery and utilization of rubber from goldenrod have been studied experimentally and on a pilot-plant scale at the Southern Regional Research Laboratory as part of the Emergency Rubber Project. (See "Retting as an Aid to Rubber Extraction from Goldenrod," RUBBER AGE, October, 1944.)

The raw material used in this investigation was the dried, ground plant material from selected strains of a variety of goldenrod (*Solidago leavenworthii*), from which the rubber was removed by solvent extraction with benzol after removal of resins with acetone. Upon complete removal of benzol, the raw rubber was so soft and sticky that its handling and compounding on either hot or cold mixing rolls were extremely difficult. Vulcanizates prepared by the addition of chemicals on mixing rolls in the conventional manner were of low tensile strength, and they contained scorched spots and air bubbles, indicating poor dispersion and poor mold flow.

Since the rubber was initially obtained in benzol solution an investigation was undertaken to determine whether the dispersion could be improved by adding a part of the compounding chemicals directly to the benzol solution. The advantages of this procedure were twofold: (1) better dispersion of some of the chemicals, and (2) considerable stiffening or "precuring" of the stock by heating the partially compounded rubber for a short time at approximately 200° F. after removal of the benzol.

This precuring permitted much better working of the rubber on the mixing rolls for the subsequent addition and dispersion of the remainder of the chemicals for complete compounding. A number of vulcanizates prepared by this solution method of compounding gave increases in tensile strength of about 2000 lbs./sq. in. over those prepared from soft stock by the conventional milling method.

A more detailed study of precuring conditions showed that when the temperature was increased to 250°-280° F. the use of smaller portions of compounding chemicals resulted in a stock suitable for milling and complete compounding and gave vulcanizates of

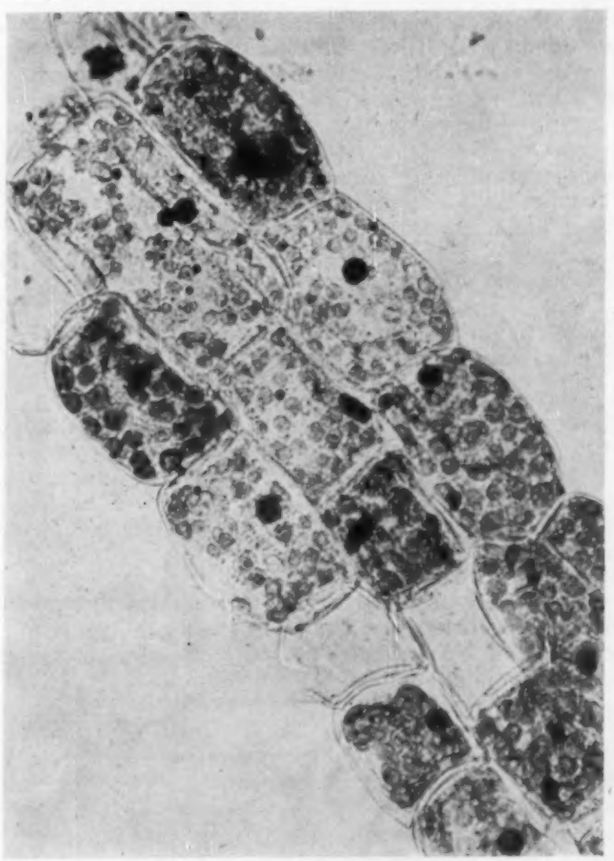


FIG. 1—Photomicrograph of rubber-bearing cells of goldenrod leaf showing isolated rubber globules (dark spheres) suspended among the green plastids of each cell. (Mag. 487x.)

* This is one of the laboratories of the Bureau of Agricultural and Industrial Chemistry, Agricultural Research Administration, U. S. Department of Agriculture.

TABLE I—CHEMICALS USED IN THE FIRST SERIES OF EXPERIMENTS ON SOLUTION COMPOUNDING.

Formula Nos.	2	3	4	
Rubber	100.	100.	100.	
Flectol H	0.5	0.5	0.5	
Sulfur	3.5	3.5	3.5	
Stearic Acid	5.0	....	....	
Mercaptobenzothiazole	1.0	1.0	....	Added in solution
Diphenylguanidine	0.3	0.3	0.3	
Zinc Mercaptobenzothiazole	....	....	1.2	
Zinc Stearate	....	5.5	....	
Zinc Oxide	6.0	5.5	5.8	
Carbon Black (Statex)	50.0	50.0	50.0	Added on rolls
Diphenylguanidine	0.5	0.5	0.5	

Note: Figures refer to parts by weight.

good quality. This finding was important because in the preparation of a semi-compounded material for possible commercial use it would permit considerably more latitude in the choice of the final compounding formula.

Experimental Work

Laboratory Conventional Milling: In an investigation of the quality of soft rubber extracted from goldenrod, chemicals were added on mixing rolls in the conventional manner. The tentative standard formula suggested by the Crude Rubber Committee* for evaluation of raw rubber was found to be unsatisfactory. By increasing the stearic acid content from 0.5 part to 5 parts and the accelerator content from 0.5 to 1.0 part it was possible to prepare vulcanizates in reasonable curing periods. This modified formula is shown as Formula No. 1.

FORMULA NO. 1

	Parts
Rubber	100.
Thiotax	1.0
Stearic Acid	5.0
Sulfur	3.5
Zinc Oxide	6.0

By curing for 60 minutes at 260° F. and 2000 lbs./sq. in. pressure, vulcanizates that had good elongations were prepared, but tensile strength measurements of a large number of samples were erratic and low, fluctuating between 300 and 1300 lbs./sq. in. These vulcanizates contained scorched spots, which indicated poor dispersion of compounding chemicals. In addition, this raw stock exhibited poor mold flow, resulting in porosity due to trapping of air. These preliminary experiments show that vulcanizates of good quality cannot be prepared from soft goldenrod rubber by the conventional milling method.

Solution Compounding: A series of experiments was made in which several combinations of compounding chemicals, including all the sulfur and most of the accelerator in solution, were added to 50-100 gram samples of rubber dissolved in benzol in glass containers. Steam baths were used to distill the benzol from these mixtures of rubber and chemicals, and vacuum was applied to lower the distillation temperature and insure complete removal of the benzol. These mixtures were heated for additional short periods in order to set up or "precure" these stocks. The remainder of the chemicals were added on the mixing rolls in the conventional manner. The completely compounded stocks were vulcanized in strips 6 inches long, 1¾ inches wide, and 0.06 inches thick, by curing at 260° F. and 2000 lbs./sq. in. on the mold.

In the first experiment on solution compounding the chemicals were added as shown in Table I, Formula No. 2. The partially compounded rubber stock, after removal of benzol, was heated on the steam bath for 90 minutes at about 200° F. The rubber at this point appeared to be uniform, but it was very soft and sticky. By heating in an oven at 260° F. for another 30 minutes it was possible to toughen or precure the material sufficiently to permit handling on the rolls. Vulcanized samples prepared from this stock were porous and contained scorched spots.

Samples containing chemicals, as shown in Table I, Formulas No. 3 and No. 4, also appeared uniform after removal of benzol, and in addition had toughened markedly after an additional heating period at 200° F. of only 30 minutes. The handling of the stock on the mill was therefore greatly facilitated. No difficulty was experienced with the rubber sticking to the rolls during the milling procedure, and the material was sufficiently nervy to permit maintenance of a tight bank, which made possible better dispersion. The resulting vulcanizates had maximum average tensile strengths of 2590 and 2535 lbs./sq. in. and had ultimate elongations of 525 and 600 percent, respectively, as shown in Table II. In addition, samples prepared without carbon were non-porous and free of bubbles.

Owing to the high temperature and longer heating time necessary for precuring the stock compounded with Formula No. 2, it appeared that either Formula No. 3 or No. 4 was more promising where zinc had been used in the soluble form in the precuring step to insure good dispersion of the accelerator activator. Formulas No. 3 and No. 4 are modifications of the

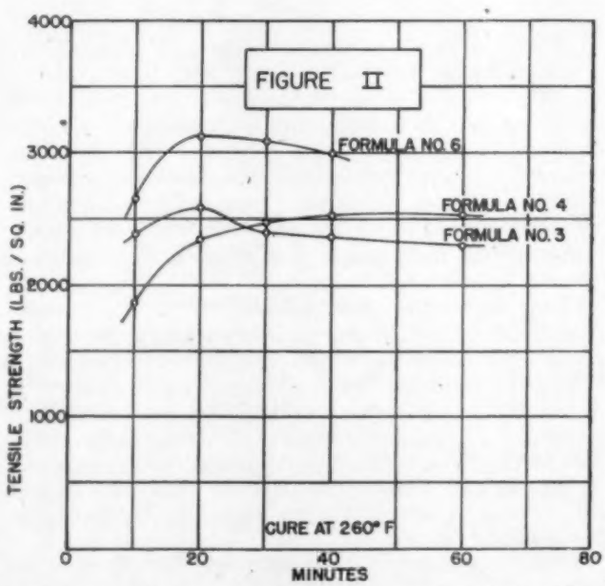


FIG. 2—Curing curves of solution compounded goldenrod rubber stocks.

* Report of the Crude Rubber Committee, Rubber Division, A.C.S., *Ind. & Eng. Chem.*, Vol. 14, No. 11, Page 215 (June, 1936).

original Formula No. 2, in which the stearic acid was stoichiometrically replaced by zinc stearate and the mercaptobenzothiazole was stoichiometrically replaced by the zinc salt of this acid, respectively. These preliminary experiments show that solution compounding is a highly advantageous step in the preparation of good vulcanizates from goldenrod rubber. (See Fig. 2, Formulas No. 3 and No. 4.)

The solution method was also tried on a sample of hevea smoked sheet. The sample of rubber was dissolved in benzol, the chemicals were added in solution, and the benzol was removed as described previously in the laboratory investigation. The only significant change in the formula recommended for hevea by the Crude Rubber Committee was the use of 0.55 part of zinc stearate in place of 0.5 part of stearic acid, as shown in Formula No. 5 below:

FORMULA No. 5

	Parts	*Remarks*
Rubber	100.	Added in solution
Thiotax	0.5	Added in solution
Zinc Stearate	0.55	Added in solution
Sulfur	3.5	Added in solution
Zinc Oxide	5.95	Added on rolls

Vulcanizates from this material cured for 80 minutes at 260° F. had an average tensile strength of 3200 lbs./sq. in. and an ultimate elongation of 825 percent. These values compare favorably with the average values reported by the Crude Rubber Committee for rubber compounded with 0.5 part of stearic acid in place of 0.55 part of zinc stearate and 6.0 parts in place of 5.95 parts of zinc oxide, all of the chemicals being incorporated by the conventional milling method. The reported values average 3265 lbs./sq. in. and 810 per cent ultimate elongation for vulcanizates cured under the same conditions.

Pilot-Plant Experiments: On the basis of preliminary laboratory experiments an investigation of the precuring step was made with pilot-plant equipment where better control of reaction conditions was possible. These experiments were made in steam-heated, internal-type mixers having capacities of ½, 1½, 8, and 20 pounds (Fig. 3), and provisions were made for benzol removal.

TABLE II—TENSILE STRENGTHS AND ELONGATIONS OF VULCANIZATES.

Formula No.	Curing time at 260° F. (Min.)	Modulus of elasticity at elongation of 300%	Modulus of elasticity at elongation of 500%	Max. T. S. (Lbs./sq. in.)	Ult. Elong. (%)
3	10	870	2035	2390	575
	20	1245	2430	2590	525
	30	1410	....	2390	475
	40	1410	....	2360	450
	60	1475	....	2295	425
4	10	335	1065	1870	675
	20	565	1530	2340	675
	30	700	1800	2470	650
	40	800	2000	2535	600
	60	1000	2370	2535	550
6	10	....	....	2655	500
	20	1520	3085	3125	510
	30	....	....	3095	475
	40	....	....	3000	435

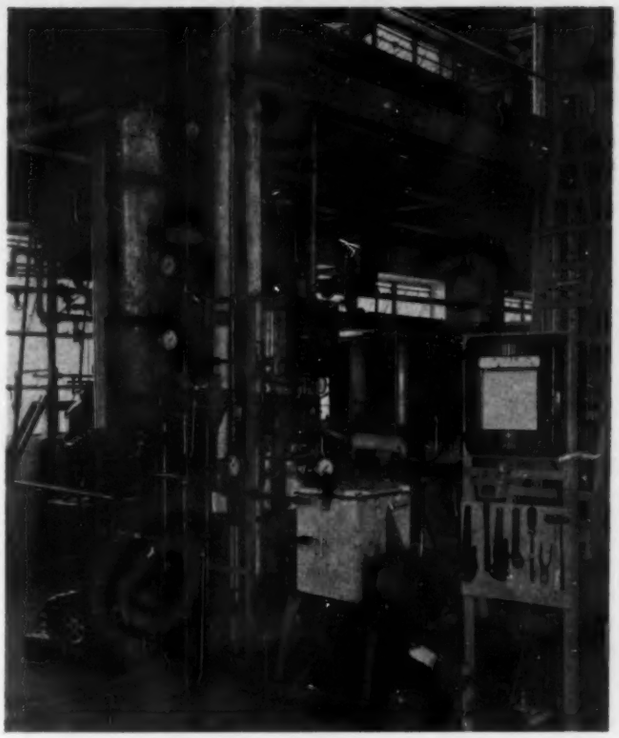


FIG. 3—View showing the jacketed Loomis mixer and accessories used in precompounding 20-pound batches of goldenrod rubber. The jacket and blades of the mixer have connections to steam for heating and to water for cooling. Vacuum can be applied for complete removal of benzol.

It was found that in order to obtain an easily controlled reaction, relatively high accelerator and low sulfur ratios were desirable, such as shown in Formula No. 6. When this formulation was used, a precured stock could be made which contained 0.4-0.6 percent combined sulfur. Higher percentages of combined sulfur, such as were obtained in stocks using more than 0.6 percent free sulfur in the initial solution compounding step, resulted in preparation of stock that was too nervy and tough for proper milling. The procedure used throughout the pilot plant investigation was essentially the same as that described below when a Loomis Internal Mixer of approximately 20 pounds' capacity was used.

FORMULA No. 6

	Added in Solution (Precure) *parts*	Added on Rolls *parts*	Final Composition *parts*
Rubber	100.	.....	100.
Sulfur	0.6	2.9	3.5
Mercaptobenzothiazole	0.75	0.25	1.0
Diphenylguanidine	0.3	0.5	0.8
Zinc Stearate	5.5	.....	5.5
Flectol H	0.5	.....	0.5
Resins	3–7	.....	3–7
Zinc Oxide	.....	5.5	5.5
Carbon Black (Statex)	.....	50.	50.

Chemicals were added to the benzol-rubber syrup, and the mixture was heated and allowed to flow into the mixer equipped for vacuum removal of benzol and with steam-heated blades and sides. After re-

moval of benzol the temperature of the mix was allowed to rise to approximately 250°F., where the material began to "set up" appreciably. The temperature rose to about 280° F. after about 15 minutes' additional heating. Exact temperature and time control at this point was not necessary. The precured material was then cooled rapidly and uniformly and discharged from the mixer.

Formula No. 6 was found to give consistently good results, several hundred pounds of goldenrod rubber being processed in this manner. Fig. 2, Formula No. 6, shows graphically a flat curing stock prepared in a typical pilot plant run. The improved quality of this stock over the laboratory prepared stocks is apparent.

It should be pointed out that with Formula No. 2, that is, when stearic acid is used in place of zinc stearate, it is conceivable that the slowly reacting composition could also be satisfactorily adapted to this procedure, permitting an easily controlled reaction at the higher temperatures. This point was not investigated since the aforementioned pilot-plant work had already produced a raw rubber stock that contained a sufficiently small quantity of chemicals to permit considerable latitude in choice of final compounding chemicals for factory-scale handling by any commercial user of this product.

Bicycle tires were made by one of the major rubber companies, several hundred pounds of raw precured stock being used in a commercial test run. These fabricated tires have not been completely evaluated; however, it is significant that on the plant's testing wheels the tires made from goldenrod rubber lasted approximately three times as long as tires made from reclaimed rubber for the present market.

The ranges for results of other tests are shown in Table III. These results, while not comprehensive, indicate that a rubber stock of good quality can be processed from goldenrod rubber by using the solution compounding method.

TABLE III—PHYSICAL TESTS OF GOLDENROD RUBBER.

Test	Method	Range of values	
	*Tread Stocks**		
Tensile	Scott	2500-3200 lbs./sq. in.	
Ult. Elong.	Scott	450-600%	
Modulus at 500%.	Scott	2500-3000 lbs./sq. in.	
Hardness	Shore	60-65	
Abrasion	DuPont	175-240 cc./H.P. hr.	
Tear	Crescent	440-500 lbs./in.	
Perm. Set		20-25%	
Sp. Gr.		1.14-1.15	
Rebound	Firestone	Room T.	32%
		212° F.	46-55%
	*Gum Stocks**		
Hysteresis	Absolute	Room T.	1.0
		280° F.	0.3
Hysteresis	Torsional, Mooney and Gerke	Room T.	0.07
		280° F.	0.06

* Gum stocks contain no carbon black in the formulation. In all other respects tread and gum stocks are identical.

Summary

A solution method of compounding rubber has been devised. It is particularly suitable for compounding a soft natural rubber such as that recovered from goldenrod, but it does not appear to be restricted to goldenrod rubber. No particular inherent disadvantage of solution compounding is indicated with hevea rubber. By proper choice of solvent and compounding chemicals the interesting possibility is presented of improving the quality of those rubbers in which proper dispersion of chemicals is difficult. This method also shows possibilities of being a valuable research tool in the pretreatment of soft synthetic elastomers as a preliminary step to evaluation of their rubber-like qualities.

ACKNOWLEDGMENT

The authors wish to thank Miss Mary L. Rollins, Fiber Technologist, Cotton Fiber Research Division, Southern Regional Research Laboratory, for the photomicrograph used in this paper.

Pliofilm Replaces Rubberized Fabric in Oxygen Tents

ACCORDING to the Goodyear Tire & Rubber Co., Akron, Pliofilm's latest war role is speeding the recovery of patients needing oxygen in Army and Navy hospitals. As a result of development work undertaken by the Continental Hospital Service of Cleveland, sections of Pliofilm are now being used in place of conventional heavy rubberized fabric in many oxygen tents in military and naval and civilian hospitals.

In the case of most patients, it is reported, the Pliofilm oxygen-tent canopy is discarded after use, thus permitting the saving of man-hours formerly required for cleaning, scrubbing and sterilizing the canopies after each use. Sometimes the used canopies are cut up, cleaned, sterilized and used subsequently for shielding wet dressings and for mattress covers and similar purposes. By disposing of the Pliofilm canopies after each oxygen tent use, higher degrees of cleanliness are said to be possible and potential danger of cross-infection eliminated.

Another advantage of Pliofilm over rubberized fabric is said to be the fact that patients in these canopies can be kept under constant surveillance due to Pliofilm's transparency. Rubberized fabric canopies usually permit observation only through windows built into them. This is important in the case of patients with varying degrees of claustrophobia, the mental state of the patient being improved by the ability to see what transpires around him at all times.

In most cases the Pliofilm canopies are fitted to an oxygen therapy chamber and extend over the upper half of the bed, enclosing the patient's body down to the knees. Some designs enclose the entire bed. Frequently, the hospitals use the small open-top Pliofilm canopy, which is stretched over a frame-work in which an infant lays upon a pillow, making it easily accessible for service. It may be folded up for ease of transportation.

Advances in Rubber During 1944

By JOHN W. LISKA

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Akron, Ohio

THE nature of the problems faced by the rubber industry in the year 1944 stands in sharp contrast to the major effort of the preceding year. Having solved the essential and primary problem of "rubber" supply in a commendable manner *(1)* there remained logically the secondary, though really no less essential, problems of the production of "rubber" goods of all types, in large quantities, from the several important synthetic rubbers, particularly GR-S, the "tire" synthetic.

Exhaustive Tests on Synthetics

Although many of the natural rubber compounding practices employed by the rubber technologists were carried over, with considerable success, to the compounding of GR-S, it is also a fact that the highest quality GR-S products are not always produced by techniques or practices known to be successful with compounds having a natural rubber base. Since all of the available synthetics lack one or more of the desirable properties of natural rubber, it was necessary that the highest possible quality be attained in the synthetic products in order to minimize their known deficiencies. The same exhaustive tests which had resulted, after years of experimentation, in the development of high quality natural rubber products, had to be repeated on the synthetics as quickly as possible.

As in the preceding year, when considerable progress was made along this line, much of this work was again done by specially appointed industry-wide committees and the results were made available to the entire industry without the formality of publication in the literature. In the current year, however, the results of many such investigations were released for publication through the efficient censorship clearance of the Rubber Director's Office.

Among the many comprehensive studies, which resulted in a rapid increase in the quality of synthetic rubber products, are those on the effects of pigments *(2 to 11)*, processing *(12, 13)*, softeners *(14)*, blending of synthetics *(15 to 21)*, the effects of milling *(22)*, compounding practices *(23 to 30)*, vulcanization and molding of synthetic goods *(31 to 41)*, the effects of sunlight, ozone and aging *(42 to 47)*, and the development of new physical and chemical methods of testing and evaluation *(48 to 65)*.

The armed services' greatly increasing requirements for compounds which retained their flexibility at low temperatures were met by the introduction of specially designed synthetics and new low temperature plasticizers *(66, 67)*. Improved methods of evaluating low temperature flexibility have been developed and described *(68 to 73)*. Additional data on cellular rubbers have been published *(74)* and new products made from this type of material—battery separators *(75)* and upholstery material *(76)*—have been announced.

At the time of this writing, the non-technical phases of quantity production—adequate manpower and manufacturing capacity—have not been satisfactorily solved. Production in some lines, particularly large size, heavy-duty tires for the armed services, is lagging behind schedule because of both of the above mentioned factors *(77, 78)*. Civilian tire production, which of course rates a considerably lower priority, is consequently still farther behind anticipated schedule. In view of this situation, the keynote of the entire industry during the current year has been expansion. In some instances, production of war materials was transferred to new locations, thus freeing existing production space and facilities and experienced labor for tire manufacture *(79)*. In others, large new plants for the manufacture of tires and tubes were designed and built, or are being built, in regions of relatively high labor availability *(80 to 85)*.

In spite of the tremendous increase in the amount of synthetics produced in the preceding year, further expansion, particularly in the line of specialty rubbers, was effected in the current year *(86)*. The completion and achievement of full operation of the government's synthetic rubber plants on the Pacific coast were also announced during the year *(87)*. Significant, too, was the report of the completion of two standard GR-S plants and one GR-I plant in Canada *(88)*. Allied industries kept pace during this expansion period with the development of new types of pigments, and building or planning of new plants for their production *(89 to 92)* and the building of new plants for the production of high tenacity (tire cord) rayon *(93)*.

Fewer Compounding Ingredients

A number of new "elasticators", plasticizers, and tackifiers were introduced, though not nearly in as large numbers as in the preceding year *(67, 94 to 101)*, in further attempts to overcome some of the chief manufacturing difficulties involved in the substitution of synthetics for natural rubber.

New types of polysulfide rubbers, Thiokol Type ST *(102)* and Type LP-2 *(103)*, were announced. The former is reported to have greatly improved resistance to cold flow while retaining the excellent solvent resis-

Note: This annual report was presented by the author at the Annual Meeting of the Rubber and Plastics Division of the American Society of Mechanical Engineers held in New York City on November 30, 1944.

tance of this class of material. Experiments on guayule rubber have been continued *(104, 105, 106)*, but the difficulties of quantity production and extraction continue to keep this natural rubber in a position of importance secondary to that of most of the synthetics.

It will be recalled that in the interests of vitally important speed, standardization and full utilization of all available technological skill, the entire government-directed synthetic program was based on an original and fundamental decision to make but one "tire rubber"—GR-S. Until full production was achieved, most of the experimentation was confined to attempts to improve the basic GR-S polymer, rather than along the line of modification of the basic polymer or the development of a completely new tire rubber. The obvious success of the synthetic rubber program to date is sufficient proof that this decision was a wise one for that critical period. However, as soon as an adequate supply of synthetic rubber was assured, the investigations of new and improved tire rubbers and new manufacturing methods were gradually expanded.

Continuous Polymerization Process

The design of all the standard GR-S plants was based on a batch polymerization process, which was carried over from laboratory investigations. Generally speaking, the production rate of an intermittent process is not as high as that of a continuous process employing equipment of approximately the same size. Consequently, the announcement of a new, continuous polymerization process *(107)* is of some interest and importance. Because of the increased production rate possible by this method, it is reported that existing plants are capable of producing 40 percent more synthetic rubber than present capacity figures indicate.

It is too early to state how much better than GR-S the new synthetics are, since many details have not yet been made available nor have the results of extensive tests been made public as yet. Copolymers of dichlorostyrene and butadiene are reported *(108, 109)* to have excellent tensile, stretch, low temperature properties, milling characteristics, tear resistance and low heat generation and gas permeability. Better oil resistance than GR-S (though not as good as neoprene or Thiokol) is claimed.

Complete information on another new synthetic will not be released until after the war *(110)*. A reduction in tread cracking, increased abrasion resistance and greater tackiness are reported for this synthetic. A further feature of this material is revealed in the claim that no major capital expenditures or changes in existing government GR-S plants are required. High resistance to high octane gasoline, high tear resistance and excellent aging properties are said to feature "Uskol" *(111)*, another new synthetic which, according to claims, can be produced with present equipment, handles easily during manufacture and which blends with other synthetics.

A fourth new synthetic, introduced in the current year, is reported to be a copolymer of butadiene and an as yet unnamed chemical *(112)*. It is claimed to have low heat build-up and crack growth, but is more expensive than GR-S at present. Virtually no details have been made public regarding a fifth synthetic announced *(113)*, though the process has already been made available to the entire industry. This development is said to embrace a technique by which a modified rubber, having special advantages, is produced.

As important as are the above-mentioned announcements, their real significance lies in the possibilities still in the future. There now appears to be a good chance that one or more of the synthetic tire rubbers will be able to compete favorably with natural rubber on a quality basis even after the end of the war when natural rubber again becomes available in quantity.

A number of fundamental studies of the polymerization process *(114, 115, 116)* and of the molecular structure of synthetics *(117 to 120)* have been published during the current year. These, together with the large amount of unpublished committee work along these lines, are responsible, to a considerable degree, for the rapid development of the new and improved copolymers mentioned above. That further advances can be expected is detailed in a timely report on polymerization and the future by a man who has been for many years recognized as one of the foremost scientists in the field of the chemistry of natural rubber *(121)*.

Widely heralded as one of the most significant advances of the year is the successful incorporation of carbon black into GR-S latex on a factory production scale *(122)*. The method, not yet adopted to any considerable extent, is claimed to yield vulcanizates having better physical properties, in some respects, than those produced in the usual manner, *i.e.*, by milling or incorporating the carbon black in a Banbury mixer. Some milling is required even when the carbon black is introduced into the latex, but a large saving in power consumed and in milling time is claimed. This development had its origin, like many another new production method, in extensive laboratory studies, some of which had been previously described in the literature *(123, 124)*. With production facilities limited and production schedules seriously lagging, any process by which milling time can be reduced, thus making increased production rates a possibility, should be a valuable "assist" to the rubber industry and is one which will doubtlessly be put to further tests in the coming year.

Reports on the compounding of neoprene latex *(125)* and the use of synthetic latices for wire insulation *(126)* and for fabric coating *(127)* have also been released, indicating a strong trend toward exploitation of this manufacturing technique. The first successful tires made with latex body stocks were built and described in the current year *(128)*.

Extensive Report on GR-S Tires

A gradual lessening of war censorship has resulted in the release of information on many of the ways in which rubber, both natural and synthetic, is helping to win the war. The U. S. Army Ordnance Dept. has released an extensive report on GR-S tires designed for military use *(129, 130)*. Though admitting that GR-S tires do not stand severe overloading or sustained high speeds, the Army has expressed its complete confidence in synthetic rubber tires. Further tests on synthetic tires and tubes are given in a report describing the operation of the government test fleet at San Antonio, Texas *(131)*.

One of the most vigorously debated questions has apparently been settled during the current year. The War Department is quoted as believing that rayon is superior to cotton in most tires, for heavy service, such as the Army car and truck *(132)*. Civilian tests (on bus company fleets) also indicate a definite superiority of rayon over cotton. The claim is made *(133)* that in

sizes 7.50/20 and up, 25 to 30 percent more tires would have been required, over a given time period, if it had not been for the use of rayon.

Several innovations in airplane tires and landing gear have been described. A new airplane ice tire, with removable lugs, is claimed to make landings on icy runways considerably safer *(134)*. A self-starting airplane tire, in which pre-rotation is achieved by means of vanes or fins in the sidewalls of the tire *(135)*, is reported to increase the number of landings a tire can make before failure. An ingenious "flying runway" is also described *(136)*. This device is reported to make landings and take-offs possible on swampy or soggy soils, where even super-balloon tires bog down or cause the plane to nose over.

Airplane Tire Testing Machine

A new airplane tire testing machine has been built at Wright Field *(137)*. Each newly-designed synthetic tire is tested here under the same tremendous stresses to which it is subjected in actual service. Investigations of this kind are enabling tire designers to minimize some of the shortcomings of the synthetic rubbers and to utilize their better features to a fuller extent.

Rubber airplane propeller cuffs which step up plane speed and increase engine cooling efficiency are reported *(138)*. Life-saving balloons made of rubber, each having a lifting power of 6,000 pounds, are being used to salvage Navy planes shot down over water *(139)*. Heating pads, made of electrically conducting rubber, are being used to maintain gun breeches at the required temperatures for instantaneous firing at high altitudes and to prevent jamming of the guns at low temperatures *(172)*. A new anti-icing boot is also being made of conducting rubber *(112, 140)*. Additional data on this unusual application of rubber has been published in the current year *(141)*.

Some of the war uses of Multipore have been released for publication *(142)*. This porous rubber is being used in the preparation and filtering of blood plasma, in the silver plating of bearings for airplane engines, in the filtering of fruit juices, etc. Many other peacetime uses are predicted for this material.

Life saving suits and waterproof instrument bags, made of synthetic rubber, are being made for the Navy and Coast Guard Services. An ingenious combination of materials—asbestos and synthetic rubber—is being used in the manufacture of a collapsible container which can be used for cooking and sterilizing *(143, 144)*.

Destructive electrolytic action has been responsible for many expensive maintenance delays and replacements on the Navy's sub-chasers. This problem has been neatly solved by "flame-spraying" Thiokol onto the steel propeller shafts *(145)*. It is reported that the new process has been extremely successful in reducing replacements and maintenance to a minimum.

A newly-patented gas mask which keeps fresh air circulating has been announced *(146)*. Inflatable invasion boats made of synthetic rubber are reported, together with collapsible aircraft cargo containers, which are particularly good for shipping extremely corrosive materials, such as hydrofluoric acid *(147)*. A rubber life boat large enough to hold twenty-five men and supplies has been described *(148)*. A synthetic rubber tape is being used to seal the fuselages, gun turrets, gas tanks and Plexiglas enclosures of our war-planes against leaks caused by strains of battle maneuvers *(149)*. Latex-dipped insulated wire is being used by the Army in large quantities *(150)*. A new type lifeboat, especially designed to prevent the capsizal of inflatable craft of this type, has been announced *(151)*. An extremely mobile, rubber track vehicle, named the "Weasel", has been described *(152)*.

Another ingenious combination of materials—Thiokol and ground cork—is being employed as a substitute for rubber matting. This new, lightweight walkway coating is reported to adhere well to metal, plywood and painted surfaces, and is claimed to be resistant to fire, gasoline, salt water, oil and hydraulic fluid, is easily applied and dries quickly *(153)*. The development of a tire vulcanizing device employing electronic principles was discussed *(154)*. This device, designed to replace Army tire repair equipment weighing tons and taking hours to operate, is reported to be mobile and through "internal" heating is said to make better sectional and spot cures within minutes.

Important aids to our Armed Forces in the invasion of Northern France were collapsible rubber contour maps *(155)*. These maps, made by spraying natural rubber latex on prepared forms, could be rolled up, after being thoroughly dried, into a small parcel for shipment in landing barges. After landing and expanding into strange territory our infantry and tanks were able, in many cases, to obtain much valuable information regarding the terrain simply by unrolling and studying these contour maps.

The electron microscope has been employed extensively in the comparison of natural and synthetic rubber fibers and in the study of the nature of carbon black reinforcement *(156, 157)*. There is much evidence to indicate that this physical research tool will be very widely used in future years.

Symposium on Physics of Rubber

At the symposium on the physics of rubber and other high polymers, held late in 1943, a number of important papers were presented by both academic and industrial physicists. Many of these papers have since been published. Included among these works are studies on the theory of elasticity of rubber *(158)*, stress relaxation *(159, 160)*, plasticity *(161, 162, 163)*, X-Ray diffraction and light scattering *(164, 165, 166)*, hysteresis and elasticity *(167, 168)*, second order transition effects *(169)*, and infrared analysis, *(170, 171)*.

The culmination of the activities of this group, begun at the physics symposium, was the organization of a new Division of High Polymer Physics, within the framework of the American Physical Society, in June of the current year *(172)*. Papers, soon to be published in the *Journal of Applied Physics*, were presented on such topics as the theory of elasticity, reinforcement of rubber, electro-static properties of rubber and GR-S, speed of retraction of rubber, stress-strain-temperature relations, physical properties of natural and synthetic rubbers at low temperatures, molecular weights, and brittle points of high polymers. If the uniformly high quality of the papers presented by this group in the current year and the individuals' interest and enthusiasm are at all indicative, future significant contributions to the knowledge and science of rubber can be expected.

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Marbon S and S-1—Heat Plasticizers and Organic Fillers

THE development of two new synthetic resins whose excellent electrical and mechanical properties make them suitable for electrical applications when compounded with the various synthetic rubbers, and whose general characteristics suggest a wide variety of applications for extruded and compression molded products, was recently announced by the Marbon Corporation, Gary, Indiana. Known as Marbon S and Marbon S-1, the materials were originally developed as substitutes for Marbon B, the cyclized rubber resin.

Marbon S and S-1 are supplied as free-flowing granular resins of amber color, although the company offers to furnish them masterbatched with various synthetic rubbers. The use of 5 to 40% of either synthetic resin with the rubbers increases the modulus, tensile, tear and abrasion resistance of the compounds. Their use is said to promote low shrinkage and to facilitate smooth tubing of so-called pure gum compounds. Both resins are essentially hydrocarbons in composition.

When compounding Marbon S or S-1 in synthetic rubber stocks, it is preferable to make up a 50-50 masterbatch of resin and rubber, adding the additional rubber required during the mixing of the finished stock. The company recommends a three-step technique, as follows: First add the resin to the mill with the rolls at 160 to 170° F. where it will form a rolling bank; then work approximately 5% of the rubber into the resin and cut back and forth several times; finally, add rubber rapidly and turn water on the rolls when approximately 50% has been added. This technique will result in a workable 50-50 masterbatch.

Both Marbon S and S-1 are compatible with dibutyl phthalate, butyl stearate, dibutyl sebacate and similar plasticizers. Marbon S softens at about 50°C. although, it does not become tacky until heated to a much higher temperature. S-1 softens at a slightly lower temperature, but both materials can be prepared in a range of softening points. Water resistance is said to be exceptional in the case of both materials, and the effect of dilute acids, salts and alkalies is negligible. Both materials have a specific gravity of 1.05, ash of .4 to .6%, and are light in color.

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Editorials . . . . . .

Military Tires Needed Now

AS REPORTED elsewhere in this issue, the need for military tires now tops all the "must" programs of the nation. No 'ess an authority than General Dwight D. Eisenhower has stated that unless shipments of military tires of all types, particularly heavy-duty tires, are increased substantially — and increased immediately — the invasion of Germany will be slowed up considerably. "I am not exaggerating," said Eisenhower, "when I say that the war will be needlessly extended unless we can extract every possible mile from our tires and use them only as we find it necessary to do so."

Although requirements of the military and of government agencies have been carefully screened, there is an immediate need for an increase of approximately 30% in the production of tires over and above the peak level achieved in the past three months as a result of an earlier appeal for more tires. The peak level, amounting to approximately 4,100,000 units quarterly, was achieved with the aid of new machinery which had been ordered months earlier and by recruiting thousands of new workers, especially from the southern states. But this record must be surpassed. Supply lines are stretching daily and tires, at the rate of more than 5,000 a day, are failing on the rough, battle-torn roads of France, Holland, Belgium and Germany.

It should be made clear that in making the urgent appeal for an addditional 30% hike in production that the government, as represented by the Army and the War Production Board, is not indulging in any criticisms of past performance. The tire manufacturing industry has not fallen down on its job of producing the tires needed for victory, but the demand has increased enormously. The tides of war fluctuate rapidly. The victorious general is one whose strategy meets the changing conditions. The state of the current conflict calls for far more tires than had been estimated. There is no argument possible. The Army must have more tires and industry must provide them.

Admitting the need for the tires and recognizing the responsibility of industry to provide them, the question, baldly stated, is how? Tires are produced by machines and men. There are not enough machines and manpower, especially skilled manpower, is extremely tight. Additional capacity could be provided by building new mills, calenders, tire-building machines, molds and heaters, but it would be six months or more before such equipment could be put into the production line. WPB has just announced that new tire-making plants will be constructed in an effort to meet the Army's huge demands, but this is still for tomorrow. At least three new plants, started a few months ago, will get into production shortly, but the additional capacity is still not enough. This still leaves the manpower question.

To put it as briefly as possible, the only answer to the Army's need for more tires immediately lies with manpower. Not additional manpower, recruited by one means or another as in recent months, but with the skilled manpower now operating the tire factories. Only if the skilled worker in the tire plant extends himself for the next few months, only if he puts every ounce of energy into his job to step up his own production, only if he licks his own absenteeism problem, only if he temporarily buries his distrust of management and continues to work while his grievances—assumed or real—are negotiated, only then will sufficient tires be sped to the fighting fronts.

There are many platitudes which might be employed at this point, directed at both labor and management. On the surface, top management and the rubber union see eye to eye on the need for greater production. Management has pledged its all to meet this need. Union officials have appealed to their entire membership to answer the call. But it all boils down to the human element, and unless the individual tire worker can be convinced of the necessity of making some sacrifice on the home front the war front will suffer. No matter what sacrifice he makes and no matter what individual effort he puts forth, he will receive no medals, no service stripes, no ribbons. He will remain an unsung hero. But for the sake of the Unknown Soldier he should deliver.

★

Holiday Greetings

THE approach of Christmas with its promise of better understanding and good feeling among men should inspire us to face with confidence the tasks of tomorrow. Rough seas and storms always subside in time and the sun shines again. With this thought in mind the staff of RUBBER AGE extend best wishes to their friends for Christmas and the New Year.

THE PUBLISHERS

CURRENT NEWS OF THE MONTH

DRASTIC STEPS ARE BEING TAKEN TO MEET CRISIS IN HEAVY-DUTY TRUCK TIRE FIELD

THE entire attention of the country has been concentrated in recent weeks on the drastic shortage of heavy-duty tires which faces the Armed Forces. Indicative of the importance which such tires now occupy are special statements which have been issued by both military and production leaders, including General Dwight D. Eisenhower, J. A. Krug, Chairman of the War Production Board, Paul V. McNutt, Chairman of the War Manpower Commission, and Lt. Gen. Brehon Somervell, Commander of the Army Service Forces. Both government and industry have taken steps to meet the situation, which is actually said to be holding up the invasion drive into Germany proper. No less an authority than General Eisenhower is credited with this statement. Although equal shortages have been reported for other critical materials, especially muntions, the spotlight is still turned on tires. The best indication of how serious the situation is is the fact that a 60-day top emergency rating over all other "must" programs has been instituted to cope with the crisis. The tire industry has been assured that requests for emergency equipment will receive quick acknowledgement on the part of the Government.

A number of meetings between leading tire executives and government officials have been held in the past few weeks. At the conclusion of one such conference, held in Washington on November 22, WPB Chief Krug called on management and labor to boost heavy-duty tire production at least 25% in the next quarter. He warned that industry must find means of doing this without the help of new equipment for even if new factories were started now, they could not be brought into production soon enough to smash the current bottleneck.

Krug Reveals Amounts Needed

Mr. Krug revealed that the Army and other government agencies had requested 6,447,437 heavy-duty truck and bus tires for the first quarter of 1945, to be used both as original equipment and as replacement stock. These requirements, he said, had been screened down to an absolute minimum of 4,941,864 tires for that quarter. According to best industry estimates, approximately 4,000,000 units can be produced in that period unless extreme steps for increased production were taken.

Fully realizing the difficulties facing the industry, Mr. Krug asked the tire manufacturers to perform another "miracle" in closing up the gap between the industry's estimate of first quarter production and the minimum requirement set by the Army and other government agencies. Measures aimed at closing this gap have already been started.

On December 2, WPB announced that its Production Executive Committee has expanded the National Production Urgency List to include aircraft tires, combat tires and truck and bus tires and tubes. This new top urgency rating includes the construction of facilities, as well as tire production, and also includes tire molds in the "facilities" category.

The new classification for truck and bus tires includes A-2 (extra large), 16.00 and up; A-3-a, 12.00 through 14.00; A-3-b, 9.00 through 11.00; A-4 medium dual bead, 10 ply, through 8.25; A-5 small single bead, 8 ply and under; A-6, 15-inch and 16-inch rim diameter, through 7.50 cross-section.

PEC at the same time requested the War Manpower Commission to have tire plants qualifying under the urgency list assigned a manpower referral rating above that of the general group of plants on the urgency list. Details of how this exceptional high rating will work out in the field were left to the War Manpower Commission. Present figures on manpower requirements to operate existing facilities at capacity are 6,258 male and 986 female workers, according to reports received from the tire industry by the Rubber Bureau of WPB.

Facilities to Be Analyzed

James F. Clark, Director of the Rubber Bureau, has asked each tire and tube company to analyze its facilities and inform WPB of what additional equipment is necessary to eliminate production bottlenecks in each plant. Top priority rating will be given to the procurement of this equipment, so that maximum production can be obtained within existing plants. Thereafter, should still greater production be required, entirely new plants will need to be built, WPB said.

The action of the Production Urgency Committee in granting a top manpower rating to the tire industry and in assuring the rapid installation of needed facilities will mean more tires for the armed forces and, when those demands are met, more tires for essential domestic distribution.

At the same time, WPB released figures on manpower needs for heavy tire construction in the Ohio area and in California. The Ohio area needs 872 men, while California needs 1,115 men and 183 women. With all facilities fully manned, in the classification A-3 through A-6, the industry can produce 4,695,341 tires in the first quarter of 1945. This is 21 percent more than the estimated output of 3,886,263 projected on November 1.

Seven-Day Week Promised

Spurred by direct appeals from the fighting fronts, leaders of management and labor have joined in a campaign with the Army, Navy, WPB and WMC to still further increase tire production at once. At a meeting held in the office of Lt. Gen. Somervell on December 10, the heads of companies manufacturing 96% of all tires signed a statement pledging themselves to take immediate steps to institute a seven-day work-week for the next 120 days and to cooperate with their employees in all efforts to stimulate production.

At the same time, Sherman H. Dalrymple, international president of the U. R. W. A., issued a statement addressed to all members of his organization engaged in the production of truck tires and tubes calling upon them to give all-out effort to the production of tires. The declarations by the tire manufacturers and the union came after Gen. Somervell had disclosed that on the basis of present allocations the Army will be short 472,000 tires of its actual requirements in the first three months of 1945.

Gen. Somervell also reported that efforts to reduce this deficit have been made by stripping all spare tires from military vehicles in this country, by recalling tire reserves from the less active theatres overseas, by using captured German tires and by pressing French and Belgian tire plants into service. (EDITOR'S NOTE: An interesting story of how one Belgian tire factory was put back into operation immediately after its capture is told elsewhere in this issue).

It was also revealed at the meeting that there are now some 500,000 wheeled vehicles in operation on the western front, which means that approximately 3,000,000 tires are in daily use. Some 5,000 of these tires are destroyed daily,

according to Gen. Somervell, which are in addition to countless other thousands daily put out of action until they can be repaired. Inspection of tire discards, it has been reported, show that 60% of removals are compelled by injury from shells, debris and cuts which often prevent repair of any degree.

Among tire manufacturers represented at the meeting in Gen. Somervell's office were Goodrich, Goodyear, Dayton Rubber, Pennsylvania Rubber, Seiberling Rubber, U. S. Rubber, Mansfield Rubber, Mohawk Rubber, General Tire, Master Tire, Firestone, Pacific Rubber, Lake Shore Tire and Armstrong Rubber. The statement signed by representatives of these companies follows:

"In order to meet the demands of our fighting men for more and more truck tires and tubes, and other rubber products critically short in military requirements, an extreme emergency confronts us. This requires emergency action on the part of all persons responsible for this production. 'Business as usual' is out:

"Fully conscious of our responsibility and duty, we, the heads of the tire and rubber industry, pledge:

"1. That we constantly recognize that the current, critical production demands can best be satisfied with complete cooperation and mutual understanding between labor and management;

"2. That there be no changes in hours, wages and working conditions except in the interest of greater production;

"3. That we intensify and improve our efforts to settle all problems and grievances and to negotiate with union representatives in accordance with the best means offered under collective bargaining;

"4. That we do everything possible to support the pledge and program of all rubber workers in America—CIO and others, and cooperate with them in their effort to prevent work stoppages and stimulate uninterrupted production;

"5. That we take immediate steps to make effective for the next 120 days a seven day week for production of these critical items;

"6. That we let no considerations interfere with our determination to keep all lines going full blast during this emergency when these critical items must be delivered to our fighting men."—End of statement.

Eisenhower's Statement

How serious the tire shortage is was indicated by the statement issued in Paris by General Eisenhower on December 5 to the effect that American armies fighting along the German border face a tire shortage which threatens to tie up 10% of all Army vehicles by early February. In a letter to his officers and men, General Eisenhower stated: "I am not exaggerating when I say that the war will be needlessly extended unless we can extract every possible mile from our tires and use them only as we find it necessary to do so."

The reason for the impending shortage, the letter continued, is that tire wear in the war theatre has exceeded all pre-combat estimates. The route of the Germans in France and the Low Countries plus their long stand at the entrances to Antwerp combined to place a tremendous burden on the Army Supply Forces. For many months the armies had to be supplied by trucks shuttling hundreds of miles from Cherbourg and the beaches of Western France. (EDITOR'S NOTE: This was known as the "Red Ball Express").

According to a statment issued by WPB Chairman Krug on November 19, if it is found that the rubber industry cannot meet the projected tire needs of the invasion, then General Eisenhower will be informed that he will have to revise his tactics and slow down the invasion until more tires or transportation facilities other than trucks can be supplied. He added that it would be disastrous to let our military leaders plan their strategy on the basis of more tires for trucks than the rubber industry may be able to furnish.

WMC Reports Needs

On November 28, WMC Chairman Paul V. McNutt reported that approximately 90,000 workers are required immediately to man work stations in plants producing "topmust" war items for which there is urgent need resulting from combat operations in the various theatres of war. In addition to the small arms ammunition program, he listed 17 critical war production programs, including tires and tubes, and said that 1,000 workers were urgently needed for the production of tires and tubes.

The report indicated that about one-half of the heavy-duty tire manpower needs are for four plants in the Los Angeles (Calif.) area, with other concentrations of a minor character scattered in almost equal numbers in Akron, Ohio, Jackson, Mich., and in the New England States. After completion of several new facilities and reconversion of others, a minimum of 4,500 additional workers will be needed for tire production—about 3,000 in Eau Claire, Wis., 800 in Waco, Texas, and 700 in Miami, Okla.

Previously, Mr. McNutt had placed Akron and twelve other war industry centers in a special bracket where "the most urgent need for workers now exists." He also disclosed that top manpower priorities henceforth will be reserved for war plants behind on critical items and that other armament facilities will no longer be permitted to recruit workers outside their own regions.

Changes in Rubber Order

On November 16, WPB issued an amendment to Appendix III of Rubber Order R-1. The appendix, now officially termed Rubber Order R-1, Appendix III, as Amended November 16, 1944, is divided into two parts. Part A contains regulations applicable to the distribution or use of end products (with the amended material covering hydraulic hose and crude rubber and latex gloves) while Part B contains special or temporary manufacturing regulations which, for the most part, involve the conversion of products from crude rubber to synthetics (with the amended material covering airborne life-rafts and GR-I plant clean-up material).

With regard to hydraulic hose, the amendment states that manufacturers can deliver certain types of hose only to persons authorized specifically by WPB. The hose affected are: (1) High pressure 1-wire, 2-wire, and 3-wire braided; (2) Medium pressure hose—Specification AN-H-6a; and (3) Low pressure—Specification AN-ZZ-H-626a.

Under the revised regulations, manufacturers of these types of hose will receive written authorization from WPB each month to make certain shipments during the following calendar month, which will cover their production for that month, and persons to whom shipments are authorized will receive instructions specifying the purpose for which the hose may be used. In some cases, however, manufacturers will be authorized to ship certain quantities of hose through regular trade channels without restriction. This hose will be able to be sold and used freely.

Users of this specific hose for whom direct shipment has not been authorized, and who are unable to obtain the product through regular channels, may, under the new regulation, apply to the Rubber Bureau, WPB, Washington, D. C. for authorization to obtain hose, stating the end use of the hose and the amount desired by size and type. Authorization will be granted only in cases essential to the war effort. In line with this policy, manufacturers of the hose must report the quantities shipped by him during each calendar month, by type, size, claimant agency, and customer.

The new amendment also states that any person who has filed a certification for crude rubber and latex gloves with his supplier, to the effect that the gloves will be sold only under the restrictions contained in R-1 (as amended), need not certify subsequent purchases from the same supplier. This regulation is also applied to the purchase of fabric-backed pressure sensitive tape.

With regard to airborne life rafts, no more crude rubber and natural latex by weight than specified below (including building cements) may be consumed per unit in the manufacture of the following rafts:

Type:	*Max. content crude & latex in lbs. (total)*
C-2	4.50
A-3	11.15
E-2	16.00
Mark II M-3-R	4.75
Mark IV M-3-R	7.00
Mark VII M-3-R	9.00
Neoprene sandwich:	
A-3	9.00
E-2	12.00

The amendment defines GR-I plant clean-up material as GR-I from which

the contamination of foreign matter has not been completely removed, and the plasticity of which varies. The revised order states that any person may consume GR-I plant clean-up material in the manufacture of any product listed in Appendix I to R-I (as amended), without specific authorization from WPB.

Two other changes were announced on November 21. Direction 2 states that notwithstanding the provisions of List 25, of Appendix II to R-1, GR-I may be consumed after December 1 in the manufacture of truck tubes for both government and civilian orders in cross-sectional sizes of 7.00 and 7.50. GR-I consumed for this purpose must of course come out of each consumer's allocation for the manufacture of tubes.

Direction 3 states that notwithstanding the provisions of List 25 of Appendix II of Rubber Order R-1, passenger tire tubes may be made in any number of grades, including conventional and special types (puncture-sealing types, heavy-gauge types, dual air chamber types, etc.), provided that (1) they are manufactured in conformity with the regulations of List 25 and (2) no more crude rubber is consumed per tube of any grade than is consumed in the manufacture of a conventional type tube in the same size.

Distribution of New Synthetics

A special procedure for the distribution of experimental GR-S type synthetic rubbers produced in plants owned by the Rubber Reserve Company has been established by that company. The procedure, which became effective December 1, provides that general information on the type and properties of all new experimental synthetic rubbers will be made available to consumers of synthetic rubber by Rubber Reserve. It also provides that Rubber Reserve will reserve for general distribution 20 bales of each original plant run of an experimental synthetic rubber and requests for amounts not exceeding 2 bales (aproximately 150 lbs.) per consumer will be filled in the order received from manufacturers desiring to test the new material.

Rubber Reserve states that if a sufficiently large number of consumers are interested in a particular experimental synthetic, and "purchase permit" requests filed with that company warrant additional production of the material, such additional production will be authorized. Requests to purchase these experimental synthetic rubbers should be filed in accordance with the instructions contained in Rubber Reserve Company's Circular No. 27.

The new procedure also provides that Rubber Reserve will sell that portion of the original production of any experimental synthetic rubber available for general distribution at the established price for standard GR-S, namely 18½c per lb. (or 14¾c per lb. for GR-S Black), plus uniform freight charges. If additional quantities of any experimental synthetic are produced, any increase or decrease in cost to Rubber Reserve may be reflected in a change in the selling price of that particular type rubber.

In announcing the method of distribution of the experimental GR-S type synthetic rubbers, which is covered in Circular No. 34, Rubber Reserve made it clear that all orders received for these rubbers will be filled upon condition that the producer will agree that a report on the rubber will be furnished to Rubber Reserve summarizing the results of any experimental work conducted. In the event the information contained in such reports appears to be of general interest, Rubber Reserve will reserve the right to summarize the results and make them available to all consumers of synthetic rubber.

MECHANICAL GOODS MAKERS GIVEN PROCEDURE FOR PRICE ADJUSTMENTS

Manufacturers of certain molded and extruded mechanical rubber goods have been provided with a general procedure for adjusting their own maximum prices when the goods are made from GR-S (Buna S). Heretofore no change except in individual cases has been permitted in maximum prices for these products because of the substitution of GR-S for natural rubber.

Products affected by the new action, termed Order No. 41 under M.P.R. 149 (Mechanical Rubber Goods), are specifically defined as "those goods for which the manufacturer had a regularly quoted price in effect on January 5, 1942, and in the production of which GR-S has been substituted for natural rubber."

Authority for any manufacturer to increase his maximum prices for these products up to a specified limit has been granted as the result of a study showing that the maximum prices for a large percentage of these items are below current manufacturing costs; that at this level of prices production is impeded or threatened, and that many applications for higher prices by individual manufacturers would be made.

The authority limits the increase that a manufacturer may obtain to the minimum adjustment that would be granted by OPA on an individual application. This limitation is equal to current factory costs, plus cash discount. Detailed instructions are given for calculation of the new maximum price, which has to be reported to OPA at least ten days before it is put into effect.

In all cases of a recomputed maximum price, there must be a redetermination of the maximum price between 60 and 75 days after the manufacturer begins production or sales of the commodity at the adjusted price. The redetermined price must also be reported to OPA at least ten days before it is put into effect.

RUBBER THREAD

Conservation Order M-124 (Rubber Yarn and Elastic Thread) has been amended to permit the direct sale or delivery of natural rubber thread produced after January 1, 1944, on orders of the Army, Navy, United States Maritime Commission, War Shipping Administration or the Veterans Administration and used by those agencies for incorporation in the manufacture of aircraft, and aircraft equipment, parachutes or barrage balloons. The amendment removes restrictions under which all natural and covered rubber thread and yarn produced prior to January 1, 1944, was stockpiled by the Defense Supplies Corporation.

Provision is also made for authorization of the use of natural rubber thread for other essential military purposes when it is established that synthetic rubber thread is unsuitable. Application for permission to use such thread must be made by letter to WPB giving the name of the contracting agency, the contract number, the end use and pounds required and the core size.

The amendment also provides a program for granting preference ratings to obtain synthetic rubber thread for the manufacture of a specified list of items of safety equipment and elastic health and surgical equipment. Applications for such priority assistance must be made by letter to the Safety and Technical Equipment Division, WPB, Washington 25, D. C. at least 15 days prior to the beginning of any calendar quarter.

As far as practicable, priority assistance will be granted for the production of the particular item manufactured by the applicant from natural or synthetic rubber thread on the basis of his average quarterly production of the item in 1943. Provision is also made for an equitable distribution when possible of synthetic rubber thread to those who did not produce a particular item in 1943.

CARBON BLACK

Sales of incremental output of easy processing channel carbon black, for which a special pricing formula was set last month, will be exempt from price control when sold by the Defense Supplies Corporation. This regulation was incorporated in Amendment No. 85 to Revised Supplementary Regulation 1 to the General Maximum Price Regulation. The incremental or additional production of EPC black is being encouraged by an inter-agency program intended to bring out a supply needed to meet wartime rubber production schedules.

Manufacturers will be given individual prices by OPA for the incremental output with the prices representing approximate total costs of production. These individual prices will vary from plant to plant, and are expected to be higher than the established prices for normal output, as a result, generally, of the necessity of using higher priced natural gas for the additional production.

All the incremental output will be bought by the Defense Supplies Corpora-

tion and distributed by that agency at weighted average acquisition cost. Since the Defense Supplies Corporation will pool the supply, and sell at an average flat price to industrial users, exempting the incremental sales by that agency from price control will have no effect on the general level of prices.

TIRES AND TUBES

December tire quotas, announced by OPA on December 1, are generally the same as those for November. The quota for passenger car tires was set at 2,000,000, an increase of 150,000 over November, and the heavy truck and bus tire quota at 120,000, an increase of 10,000. The quota of small truck and bus tires is 280,000; tractor-implement tires, size 7.50 or smaller, 50,000; and tractor-implement tires larger than 7.50, 20,000. Each of these is unchanged from November.

In issuing the quotas OPA made it clear that available tire supplies, particularly in the heavy-duty truck tire category, continue to fall far short of demand. In the passenger car tire field a backlog of 750,000 approved applications for new tires still remains in the local rationing boards and although the increased December quota is expected to cut down this backlog somewhat, a substantial backlog is still expected to be on hand by the end of the current month.

Used Army Tires Offered

Used C-1 rubber tires no longer fit for Army service, which are to be sold by the government for civilian use, have been provided with wholesale ceiling prices. The ceilings, which are incorporated in Order No. 12 under Supplementary Order 94 (Sales by Government Agencies and Resales by Certain Buyers) and which are effective December 12, are $30 per ton, f.o.b. shipping point, on sales by the Procurement Division of the Department of the Treasury to manufacturers, and $40 per ton, f.o.b. destination, on sales by manufacturers to tire dealers.

Tire manufacturers are expected to resell the tires to dealers, vulcanizers and recappers for repair and resale to the public. Ceiling prices already established in the retail rubber tire regulation will apply on sales to consumers. They vary according to the condition of the tire.

No estimate is available as to the number of these tires to be turned over for civilian use. According to information supplied OPA by the Army, the tires come chiefly from the war fronts and are taken from various types of Army vehicles. Although no longer suitable for Army use, they may be reconditioned for limited civilian service.

Amendments to Ration Order

Two additional amendments to Ration Order 1-A (Tires, Tubes, Recapping and Camelback) have been issued by OPA since our last report. They are:

Amendment No. 90, issued November 30 and effective December 4, disallows the former right of police and fire departments to maintain an inventory of emergency reserve of tires; permits an automobile dealer or the RFC to secure a certificate for a Grade III tire to be mounted on a new 1942 car held for sale; and provides that a consumer who acquires tires from the Procurement Division of the Treasury Department shall turn in the tires to be replaced to a dealer or manufacturer. Other minor adjustments are made.

Amendment No. 91, issued December 4 and effective December 5, removes the few used passenger car tires still in the hands of tire dealers from rationing. Most of these tires are the residue of the 6,800,000 used tires purchased from motorists by DSC two years ago. In removing these tires from rationing, OPA also changed the definition of Grade I tires to include factory seconds and tires made of reclaimed rubber. Both of these tires, as well as new and undamaged synthetic rubber tires, continue under rationing.

MISCELLANEOUS ORDERS

The following additional orders, of general interest to the rubber manufacturing industry, were also issued in recent weeks:

Manufacturers of wet ground mica may sell on an adjustable pricing basis pending final decision by OPA regarding requests for price increases by some producers. Present producers' ceilings for such mica are March, 1942, prices for each producer, plus $5.00 per ton. The adjustable pricing provision is covered in Order No. 8 under M.P.R. 347 (Mica).

All restrictions on the use of tantalum, which finds application as a catalyst in the production of synthetic rubber, have been removed by the revocation of Order M-156. Increasing supplies of tantalite ore and a leveling off in demand for tantalum in finished products led to the decision.

Ethyl cellulose has been placed under the control of the general chemical order —M-300 — and amended Schedule 19 (polystyrene and polydichlorostyrene) and Schedule 35 (urea and melamine aldehyde molding compounds) of that order. Order M-175, previously covering the allocation of ethyl cellulose, has been revoked.

Distributors of farm machinery and equipment are now able to secure AA-2 preference ratings for a number of repair parts for resale to dealers serving farmers, including rubber belting, rubber inflations for milking machines, rubber grain drill tubes, and rubber milking machine tubing.

REPORT ON OPERATIONS OF RUBBER DEVELOPMENT CORPORATION

In recent weeks a statement covering the natural rubber procurement activities of the Rubber Development Corporation was made public. The statement is in effect a report submitted to Leo T. Crowley, FEA Administrator, by Douglas H. Allen covering the period of his jurisdiction over the program as president of the RDC prior to his retirement from that post on September 30. Highlights of the 22-page report, as incorporated in the letter of submission from Mr. Allen to Mr. Crowley, follow:

Highlites of the Report

(1) Amount of rubber acquired: From April 1, 1942, to August 31, 1944, the total amount of natural rubber acquired from all foreign sources and imported into the United States was 214,148 long tons or 479,691,520 pounds. Out of this total, 166,046,720 pounds or 35.3% came from Ceylon and India and from African sources under allocation by the Combined Raw Materials Board; 152,949,440 pounds or 31.9% came from Latin America, and 73,431,680 pounds or 15.3% came from Liberia. The remaining 17.5% came mostly from Far Eastern sources through shipments which were in transit when such sources were lost to Japan.

(2) Cost per pound of rubber acquired: From April 1, 1942, to August 31, 1944, the total cost of all natural rubber acquired from foreign sources was $173,166,634.88, or 43.74c per pound. The cost of all rubber from Ceylon, India, other Far East and Africa (except Liberia), part of which is subject to reverse Lend-Lease, was $48,720,895.93, or 28.74c per pound. Computation of each of the foregoing unit prices is based upon U. S. imports during the period, less 83,764,800 pounds of rubber received from Far Eastern sources which was purchased and shipped prior to April 1, 1942, but imported into the United States after that date. The cost of plantation rubber from Liberia was $20,403,839.33 or 27.79c per pound. The cost of wild rubber from Latin America was $104,041,899.62, or 68.02c per pound. The combined cost of all rubber from Latin America and Liberia, the areas for which the United States Government assumed responsibility, was $124,445,738.95 or 54.97c per pound.

All overhead and administrative expenses of Rubber Development Corporation have been charged against Latin American rubber, no proration of such expense having been made against rubber from other foreign sources.

Unit costs of Latin American rubber are shown on a net disbursement basis, *i.e.,* gross disbursement less cash on hand in banks and cash equivalents such as amounts due from other agencies of the United States, inventories of crude rubber and of tires and tubes and inven-

tories, less reserves against loss and deterioration of merchandise such as tappers' supplies and equipment customarily sold for cash.

All expenses of every kind, with the exception of expenses for experimental work in Haiti, have been charged into the cost of rubber acquired as well as the full amount of all property, plant, and equipment, all capital investments and all loans regardless of the fact that there should be a substantial recovery on these items and that such items will ultimately be spread over all rubber delivered to the end of the contract period (December 31, 1946) in the same way that the capital value of synthetic rubber plants is amortized over rubber produced in a five-year period.

Costs of Rubber Compared

In the last war, when all major producing areas were open to the Allies, rubber cost an average of around 75 cents per pound, and in the peace-time years of 1925-1926 plantation rubber sold as high as $1.20 per pound and maintained an average of 61 cents per pound. Prior to Pearl Harbor, the market price for Far Eastern plantation rubber ranged between 18½ cents and 22½ cents per pound, and such small quantity of wild rubber as was available at Amazon ports was selling in Belem at around 20 cents per pound.

At the present time in areas of the Western Hemisphere outside of the cooperative controls established by the Inter-American Rubber Agreements, $2.00 to $5.00 per pound is being offered for crude rubber.

(3) Discontinuance or adjustment of certain projects: Certain projects which were undertaken to further the procurement of rubber in the Amazon and in other parts of Latin America, prior to the formation of Rubber Development Corporation in February, 1943, were found to be impractical or out of proportion to the results likely to be accomplished. All such projects were discontinued or adjusted to a sound and realistic basis.

Among such projects a large scale cryptostegia plantation project in Mexico was discontinued before any substantial investment had been made. A cryptostegia plantation project in Haiti, in which a large investment had been made, was discontinued in the Spring of 1944 when it became apparent that little rubber would be available from this source during the anticipated period of the war emergency. The loss on this project was $6,343,320.23.

(4) Disposal of excess stocks in the United States: Primarily as a result of the discontinuance or adjustment of various projects, material was accumulated in the United States having a cost value of $7,365,799.91. Of this amount $7,149,669.85 was disposed of by Rubber Development Corporation at a loss of only 5.3%. The remaining $216,130.06 was turned over on August 1, 1944 to the designated disposal agencies in accordance with an Executive Order of the President, dated February 19, 1944.

(5) Personnel: As at August 31, 1944, total American personnel in Washington and in the field was 440 compared with a peak number of 725 on June 30, 1943. It has been the policy of Rubber Development Corporation to replace American field personnel with local personnel to the greatest feasible extent and as rapidly as possible. At present only 21.6% of total field personnel consists of Americans. The total number of employees of the Corporation in Washington and in the field as at August 31, 1944, was 1,465, and the average compensation was $1,895 per annum.

(6) Aviation activities: The aviation activities of Rubber Development Corporation in the Amazon area have been progressively curtailed. This curtailment became possible, without adversely affecting the program, as the need for emergency shipments by air of supplies and equipment declined due to improvement in river transportation. Additional marine units have been made available by Rubber Development Corporation for service on the Amazon River on a lease basis or through sale to operators, and have resulted in this improved transportation. The Corporation will receive the approximate cost price less depreciation of the four airplanes which it disposed of in this adjustment of its program.

(7) The need for natural rubber: Natural rubber is more urgently needed than even before and the adjustments which have been made as the program matured have not resulted from any decrease in the urgency of this need.

In the first eight months of 1944, 72,427 tons of natural rubber were imported into the United States as compared to 42,912 tons in the same period in 1943. Between January 1, 1944, to October 1, 1944, our reserves of synthetic rubber increased from 41,568 tons to 119,780 tons. Despite these importations and despite adequate supplies of synthetic rubber, our reserves of natural rubber declined from 139,594 tons on January 1, 1944, to 92,371 tons on September 30, 1944.

Until the war is successfully ended both in Europe and in the Pacific, or until the plantation areas of the Far East are recaptured and reopened, the critical shortage of natural rubber and the urgency that all available sources be kept at maximum production will continue.

Rubber Development Corporation, therefore, must continue and intensify its efforts to secure the maximum possible quantity of natural rubber from all available foreign sources.

Crude Stocks at Low Ebb

Warning that the over-all rubber problem is far from solved and that Allied stocks of crude rubber are now at their lowest ebb since the start of the war, the Combined Raw Materials Board appealed on November 29 for augmented production from all rubber-growing areas and for more strenuous conservation efforts in all the United Nations. The Board made a sharp distinction between the highly successful synthetic rubber program in the United States, which has received so much public attention, and the continuing shortage of natural rubber. The natural product is being used faster than it is being imported, the Board stated. Substantial supplies of natural rubber are indispensable in the manufacture of extra heavy truck and bus tires and airplane tires. These tires are now in critical demand.

Unfavorable Weather Factor

Unfavorable weather in Ceylon, the largest single source of crude rubber for the United Nations, has eliminated expected gains in supplies, the Board disclosed. At the same time, less favorable reports are coming from the wild rubber areas of South America and Africa. It is imperative that these supplies be maintained and, if possible, enlarged.

Difficulties created by the less favorable supply prospects have been aggravated by new urgent demands from France, Belgium, and other parts of liberated Europe. These countries must have some natural as well as synthetic rubber in order to start again the production of tires and other rubber goods, which are desperately need for local rehabilitation.

The Board emphasized that the disaster of a rubberless economy has been avoided. The Board believes that, through increased efforts in production and through utmost saving in the use of crude rubber, a delicate balance between supply and requirements of the natural product can be attained in 1945. Such a balance has not yet been achieved, however, the Board stated. Unless such balance is shortly arrived at, stocks will continue to decline dangerously until Far Eastern supplies are once more available.

The Combined Raw Materials Board indicated that the present need for rubber conservation is so great that the shift over from natural to synthetic rubber was being pressed not merely in the United States and Great Britain but also in other important consuming countries. This shift to synthetic rubber, the Board stated, must be pushed in every country to the limits of technical feasibility. It was admitted that this might involve some sacrifice in the quantity and quality of tires produced. But, it was indicated, this is not too much of a price to pay to keep our natural rubber stocks from falling below the danger level.

WPB Authorizes New Project

Goodyear Tire & Rubber Co., Akron, has been authorized by the War Production Board to construct new facilities for the production of vinyl chloride copolymers at Natrium, W. Va. WPB stated that the total cost of the project is estimated at $1,500,000.

ASME RUBBER-PLASTICS GROUP HOLDS ITS ANNUAL MEETING

Two interesting technical sessions were held by the Rubber & Plastics Division of the American Society of Mechanical Engineers in conjunction with the annual meeting of the parent society held at the Hotel Pennsylvania in New York City the week of November 27. Both sessions of the Divison were held on November 30, with approximately 100 members and guests in attendance at each session. E. F. Riesing, chief automotive engineer of the Firestone Industrial Products Co., Detroit, who acted as chairman at the rubber session, was elected chairman of the Division for 1945, succeeding Gordon M. Kline, of the National Bureau of Standards.

Three papers featured the first session held by the Division on the morning of the meeting. This was the plastics session and the papers were: *Creep Properties of Molded Phenolic Plastics at Elevated Temperatures,* by W. J. Gailus and David Telfair, Plastics Division, Monsanto Chemical Co., Springfield, Mass.; *Effect of Some Environmental Conditions on the Permanence of Cellulose Acetate and Cellulose Nitrate Sheet Plastics,* by T. S. Lawton, Jr., and H. K. Nason, Plastics Division, Monsanto Chemical Co., Springfield, Mass.; and *Properties and Development of Papreg—High-Strength Laminated Paper Plastic,* by E. C. O. Erickson and George E. Mackin, Forest Products Laboratory, Madison, Wisconsin.

The afternoon session featured two technical rubber papers and extensive reports on the developments in rubber and plastics during the current year. These reports were delivered by J. W. Liska, of the Firestone Tire & Rubber Co., and Gordon M. Kline, of the National Bureau of Standards, respectively. The report on advances in rubber appears in full elsewhere in this issue.

The first technical rubber paper was on "Creep and Relaxation in Rubber Products," by R. D. Andrews and A. V. Tobolsky, of Princeton University, Princeton, N. J., and was read by Dr. Tobolsky. Laboratory work measuring the chemical changes taking place in natural and synthetic rubbers at high temperatures was described by Dr. Tobolsky who stated that two chemical reactions take place simultaneously in the rubber at such temperatures and change the structure of the rubber network. He described the first reaction as one which cuts the long chain molecules in the rubber and the second as one in which the molecular chains are linked together. Both reactions occur in the presence of oxygen, he said, and are constantly competing with each other, each undoing the work of the other.

"The cutting reaction tends to make the rubber soft and tacky," according to the speaker, "while the cross-linking reaction tends to make the rubber hard and brittle. Whether a rubber softens or hardens when it deteriorates at high temperatures depends on which of the two reactions is the faster. In natural rubber, cutting occurs more rapidly than cross-linking at first but later the rate of cross-linking overtakes and passes the rate of cutting. This is the reason that natural rubber softens first and then hardens when heated in air at high temperatures.

"In Butyl rubber, cutting is always faster than cross-linking and so Butyl softens in heat aging. In GR-S, the rubber molecules are always cross-linked more rapidly than they are cut. Therefore the rubber becomes hard and brittle if it is heated for any length of time. Buna N type synthetic rubbers also harden in the same way. The very good heat aging properties of neoprene are not due to unreactiveness of the rubber, because both deteriorative reactions occur very rapidly in neoprene. The reason is that the two reactions occur at almost the same rate, and so practically cancel each other."

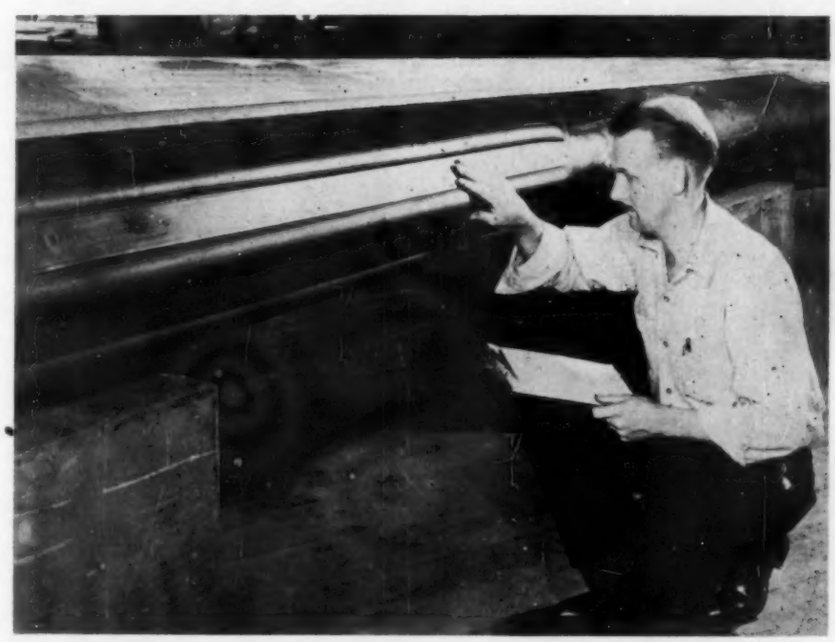
Wehmer Discusses Adhesives

Fred J. Wehmer, technical director of the adhesive division of the Minnesota Mining & Manufacturing Co., St. Paul, Minn., presented the second technical paper at the rubber session. Taking as his subject the "Use and Evaluation of Some Specialty Adhesives," Mr. Wehmer said that exploitation of many new developments in the field of adhesives during the war period holds promise of postwar growth for the entire industry.

"The uses to which adhesives are put are almost beyond enumeration," Mr. Wehmer declared. "The war has put an emphasis on replacement materials, and as a result many new resins and other materials are being used as adhesives. A large adhesive field, and one which is growing, is the field of structural adhesives. These may vary from the vulcanizing adhesives used to fasten rubber and synthetic rubbers to metals, to adhesives for plywood, and adhesives for lamination of metal parts. This field is being exploited very vigorously at the present, and we feel that the developments in this field will be many and outstanding."

Another type of material which has very unique properties is that made from latex or water dispersed resins. Included in this group are the water dispersed reclaims and the glues and starches. They offer the advantage of a non-toxic solvent along with the fact that there is no fire hazard connected with the usage of this type of material. Materials of this type find a large usage in combining paper and cloth, and crude and synthetic rubber latex give unique films in that they are flexible over a wide range and possess quite a bit of elongation.

NEW TYPE DE-ICER IS APPLICABLE TO FASTEST FIGHTER PLANES



In the accompanying illustration a technician is shown testing the pulsation cycle of the inflation tubes in a new type de-icer which has been developed by the B. F. Goodrich Co., Akron. Known as the "Type 11" De-Icer, the new model is thinner and lighter than earlier ones and yet packs a heftier ice-breaking punch. It has been found suitable for use even on such superfast war planes as the Northrop P-61 "Black Widow" night fighter. The Type 11 De-Icer has many advantages over the previous types: the attachment edge is thinner, weight is reduced by elimination of sponge filler and reinforcement strips, greater compactness has been achieved by the more effective use of fabric and rubber, and it can be installed more easily with less strain on the rubber.

DETROIT CHRISTMAS PARTY CONVERTED TO A SMOKER

Forced by a labor dispute to dispense with the scheduled dinner, the Christmas Meeting of the Detroit Rubber & Plastics Group, Inc., held at the Detroit Leland Hotel in Detroit on December 8, was converted to a smoker. Approximately 200 members and guests were in attendance, all of whom took the conversion in the proper spirit.

The meeting was featured by announcement of newly-elected officers of the group, a talk on "Captured Equipment" by Major W. S. Rigby, Intelligence Officer of the Detroit Office of the Chief of Ordnance, special entertainment, and the distribution of prizes. The new officers are J. C. Dudley (Chrysler), chairman; R. J. Shroyer (Vanderbilt), vice-chairman; and E. J. Kvet (Baldwin Rubber), secretary-treasurer.

In his talk, which included the presentation of a captured German film showing the manufacture and operation of the German medium tank, Major Rigby discussed enemy and transport vehicles and did not hesitate to credit the Germans, in particular, with some extremely effective equipment. Japanese equipment was termed "simple but workable." Major Rigby assured his listeners that in maneuverability, fire power and general dependability, American tanks still top the enemy by an appreciable margin.

The entertainment was furnished by H. Walter Grote, midwest representative of the Wilmington Chemical Corp., who again astonished his audience with his feats of legerdemain. This time the popular magician of the rubber industry used eggs, Chinese laundry tickets, and finally a pack of cards to mystify and befuddle the audience. The evening was concluded with the distribution of prizes made possible by donations received from the following concerns:

American Cyanamid & Chemical Corp., American Zinc Sales Co., Advance Solvents & Chemical Corp., Baldwin Rubber Co., Barrett, Binney & Smith Co., Godfrey L. Cabot, Inc., Carter Bell Mfg. Co., Central Rubber & Steel Corp., Corduroy Rubber Co., Dow Chemical Co., DuPont, Firestone, Flintkote Co., General Magnesite & Magnesia Co., General Tire & Rubber Co., Givaudan-Delawanna, Inc., C. P. Hall Co., Herron Bros. & Meyer, Hercules Powder Co., J. M. Huber, Inc., Hycar Chemical Co., *India Rubber World*, Industrial Rubber Goods Co., Monsanto Chemical Co., Moore & Munger, H. Muehlstein & Co., F. F. Myers Co., Minnesota Mining & Mfg. Co.

Also Naugatuck Chemical, Neville Co., N. J. Zinc Co., Pequanoc Rubber Co., Philadelphia Rubber Works, Phillips Petroleum Co., Piqua Stone Products Co., RUBBER AGE, A. Schulman, Inc., Sharples Chemicals, Inc., Henry L. Scott Co., Stamford Rubber Supply Co., Stanco Distributors, Inc., Standard Chemical Co., Sun Oil Co., Thiokol Corp., U. S. Rubber Reclaiming Co., R. T. Vanderbilt Co., Whittaker, Clark & Daniels, Inc., C. K. Williams & Co., Wilmington Chemical Corp., Witco Chemical Co., Xylos Rubber Co.

Coming Events

Dec. 18. Northern California Rubber Group, Christmas Party, Orinda Hacienda, Oakland, Calif.

Jan. 8-12. S.A.E. Annual Meeting, Book-Cadillac Hotel, Detroit, Mich.

Feb. 6. Los Angeles Rubber Group, Hotel Mayfair, Los Angeles, Cal.

Feb. 28. A.S.T.M. Spring Meeting, Hotel William Penn, Pittsburgh, Pa.

June 18-22. A.S.T.M. Annual Meeting, Hotel Statler, Buffalo, N. Y.

Sept. 10-14. American Chemical Society, Annual Meeting, Chicago, Ill.

Offer Surplus Machinery

An absolute public auction sale of surplus rubber machinery and equipment of the Victor Products Corporation was scheduled to have been held at that company's Hagerstown, Maryland, plant on December 14. Refiners, mills, crackers, calenders, mixers, presses, pumps, accumulators, tubers and cutters were among the equipment offered. Laboratory equipment was also offered. The sale was under the management of the Industrial Plants Corporation, of Toledo, Ohio, which maintains branch offices in New York, Chicago and Pittsburgh.

Holstein Rubber Suspended

The War Production Board has issued a suspension order which prohibits the Holstein Rubber Products Co., Inc., Hartford, Conn., from consuming any rubber, including reclaimed and scrap rubber, to make any product, unless specifically authorized, until March 16, 1945. According to WPB, the company used a substantial amount of scrap rubber between September, 1942, and April, 1944, in the manufacture of church kneelers in violation of Orders M-15-b and R-1.

Eide Elected Vice-President

Howard I. Young, president of the American Zinc, Lead and Smelting Co., St. Louis, Mo., has announced that the board of directors of the American Zinc Sales Co. and the American Zinc Oxide Co., wholly-owned subsidiaries of the American Zinc, Lead and Smelting Co., have elected Alwin C. Eide a vice-president of both of those companies. Mr. Eide's offices are located at Columbus, Ohio.

BUFFALO RUBBER GROUP NAMES DAVIS AND THROM FOR 1945

A. H. Davis, of the Dunlop Tire & Rubber Co., was elected chairman, and C. Throm, of the Commercial Chemicals Co., vice-chairman, of the Buffalo Rubber Group at the Annual Christmas Meeting and Party of that group, held at the Hotel Westbrook in Buffalo, on December 7. F. Adair, of the Linde Air Products Co., was elected secretary-treasurer. H. J. Deney (Pierce & Stevens), A. J. Schorr (Vanderbilt) and E. C. Siverson (Buffalo Weaving & Belting) were elected as members of the Executive Committee.

Approximately 100 members and guests attended the meeting which, with the exception of the election, was devoted to dinner, entertainment and the distribution of prizes to holders of lucky number tickets. A large number of prizes was distributed through donations received from the following:

Advance Solvents & Chemical Co., Akron Chemical Co., L. Albert & Son, American Resinous Products Co., J. T. Baker Chemical Co., Barrett Division of Allied Chemical & Dye Corp., Colonial Beacon Oil Co., Commercial Chemicals Co., J. M. Cranz, Du Pont, Farrel-Birmingham Co., General Atlas Carbon, Globe Woven Belting Co., Godfrey L. Cabot, Inc., C. P. Hall Co., Henry L. Scott Co., Hewitt Rubber Corp., J. M. Huber, Inc., Hycar Chemical Co., *India Rubber World*, International Smelting & Refining Co., Monsanto Chemical Co., National Rubber Machinery Co., N. J. Zinc Co., Niagara Sprayer & Chemical Co.

Also Pequanoc Rubber Co., Phillips Petroleum Co., Philadelphia Rubber Works, Pierce & Stevens, Inc., Rex-Hide, Inc., John Royle & Sons, RUBBER AGE, A. Schulman, Inc., Stanco Distributors, Socony-Vacuum Oil Co., Thiokol Corp., Titanium Pigment Corp., United Carbon Co., U. S. Rubber Reclaiming Co., R. T. Vanderbilt Co., C. K. Williams & Co., Witco Chemical Co., Wilmington Chemical Corp., Xylos Rubber Co.

Withdraw Farrel Stock Offer

Stockholders of the Farrel-Birmingham Co., Inc., Ansonia, Conn., and Buffalo, N. Y., have received formal notice that the offer of the Hayes Manufacturing Co., of Grand Rapids, Mich., to purchase the stock of that company (see RUBBER AGE, October, 1944, page 72) has been withdrawn because the required number of shares had not been deposited.

Continental in Larger Quarters

Continental Machinery Co., manufacturers and dealers in rubber, plastics and allied machinery, for both the domestic and foreign market, has moved from 305 Broadway to new and larger quarters at 261 Broadway, New York 7, N. Y. The phone number remains as WOrth 2-1650. Harry J. Smith is president of the company.

ATWATER AND GEENTY HEAD THE BOSTON RUBBER GROUP

Harry A. Atwater (Hood Rubber) and James R. Geenty (Goodall-Sanford) were elected chairman and vice-chairman, respectively, of the Boston Rubber Group, at the combined Winter Meeting and Christmas Party, held at the Hotel Vendome in Boston, Mass., on December 8. Charles E. Reynolds (Cambridge Rubber) was elected secretary-treasurer, and Fred Langhorst (Hodgman Rubber) and Richard Patrick (Windram Manufacturing) were named to the Executive Committee. Approximately 350 members and guests attended the meeting.

During the course of the business session a referendum was voted on to the effect that the Boston Rubber Group include a permanent historian in its list of offices. This referendum was approved and Harold P. Fuller (Pequanoc Rubber) was elected as the first permanent historian of the group. A vote was also held on whether the group should change its name to the Boston Rubber & Plastics Group, and although a majority favored such change the approval lacked a two-thirds majority and therefore the group will continue to be known as the Boston Rubber Group. Harold P. Fuller, Al Glidden and Jesse Mason acted as the Auditing Committee.

The Treasurer's Report, submitted by Mr. Geenty, the retiring secretary-treasurer, disclosed that the group had a total of 410 paid-up members. It also revealed that whereas the fund in the treasury amounted to only $560.62 as of January 1, 1944, it had climbed to $1,334.53 by December 1, 1944. The report was unanimously approved. The meeting also featured a technical talk, entertainment and the distribution of prizes to holders of lucky number tickets. Some twenty-five prizes were distributed.

Brous Is Principal Speaker

S. L. Brous, technical sales manager of the Chemical Division of the B. F. Goodrich Co., Cleveland, was the principal speaker. Chairman Joseph L. Haas (Hodgman Rubber) introduced A. A. Glidden, director of research of the Hood Rubber Co., who in turn introduced the featured speaker. Mr. Haas referred to Mr. Glidden as one of the "true pioneers of the plastics field," while Mr. Glidden gave a brief outline of Mr. Brous' technical background.

Taking as his subject "Plastics in the Rubber Industry," Mr. Brous first remarked that the title of his paper was a bit incongruous, since rubber is a plastic and many plastics are rubber-like. He invited audience participation to properly define "rubber" and "plastics" and awarded five dollar bills to two members of the audience for their definitions. He then briefly traced the history of the plastics field from Hyatt's commercialization of cellulose nitrate up through modern developments and indicated by chemical formulations the close relationship "between those materials identified loosely as plastics and those identified loosely as rubber."

Mr. Brous related how the plastics industry started out by using many techniques adopted from the rubber industry, such as compression molding, and said that the conventional rubber mill was one of the first tools used by the new industry, the use of which still survives. In turn, he pointed out, some of the special processes developed for plastics, such as injection or jet molding and transfer molding, are now being adapted to rubber.

The speaker then launched into a discussion of some of the latest developments in plastics, particularly where they fit into the rubber manufacturing picture. He told of vinyl resin latex, which exhibits many of the fundamental characteristics of natural rubber latex; of the use of vinyl resin base materials in the shoe industry; of injection molding of elastomeric plastics, stressing their favorable economic importance; and of extruded elastomeric vinyl resins, which require no vulcanization but call for a simple forming operation.

In concluding his talk, Mr. Brous emphasized the point that the plastics industry does not intend nor does it desire to compete with rubber, metal or any other material of construction, but is convinced that there is a place where each material will do a particular job better than any other material. He decried the "marvelous applications" which have been promised for plastics by over-enthusiastic post-war planners and stated that "the plastics industry is not a glamour girl with tinsel in her hair but an accepted member of industry with dirty fingernails and a smudge on her nose."

Cabot Acquires Retort Chemical

As of January 1, the Cabot Carbon Co., subsidiary of Godrey L. Cabot, Inc., will take over the plant and all facilities of the Retort Chemical Co., of Gainesville, Florida. The parent firm of Godrey L. Cabot, Inc., which maintains headquarters at 77 Franklin St., Boston, Mass., will act as selling agents for all Retort chemical products, including the pine tar specialties. While Cabot has no immediate plans for increasing the production of the plant, it will do so when conditions warrant.

COLLAPSIBLE RUBBER CONTOUR MAPS AID ALLIED INVASION FORCES

Three-dimensional terrain models, made of rubber and rubber substitutes from a process developed by the U. S. Rubber Co., are now in use in studying invasion objectives before Navy and Marine operations are launched. These models are based on aerial photographs, reconnaisance reports, and pre-war maps which have been brought up to date, and are constructed mainly from molds cast from original models (see RUBBER AGE, July 1944, page 389.) The accompanying illustration depicts a map after completion. The seizure of Attu was implemented by the careful perusal of this model of the Aleutian island.

ONTARIO RUBBER GROUP HEARS DISCUSSION ON WILD RUBBERS

Approximately 55 members and guests attended the meeting of the Ontario Rubber Section of the Chemical Institute of Canada, held on November 27 at the University of Toronto in Toronto, Ontario. W. L. Hough, of the H. A. Astlett Co., New York City, was the principal speaker at the meeting.

Mr. Hough, an expert on wild rubbers, took that topic as his subject and discussed the collection, quality and uses of the various and innumerable grades. He talked about Fine Para, Islands Fine, Weak Fine, Coarse, Caucho Ball, Centrals or Central Scrap, Ceara Scrap, Jequie Sheets, Mangabeira, and African Rubber. Old and new methods of collecting and preparing these various rubbers were outlined.

Explaining that wild grades of rubber are usually thought of in four general groups, *i.e.*, Paras, Central, Manicobas and Mangabeiras from East Brazil, and Africans, the speaker stated that there are now supposed to be great quantities of Manicoba and Mangabeira available in South America in fairly accessible areas, but he questioned the value of these materials as crude rubbers. In the past, he said, very little of this material was imported, and when an occasional lot came through it was sold on sample and used by the manufacturers of mechanical goods and sometimes as a filler.

In concluding his talk, Mr. Hough said that "it will be a happy day when the Japanese are defeated and driven out of the rubber-producing areas, and shipments of smoked sheets and crepe are again arriving from the Far Eastern plantations."

Northern California Hears Vodra

The final technical meeting of the year of the Northern California Rubber Group was held on November 16, at the Hotel Claremont, in Berkeley, Calif. The principal speaker of the evening was Vic Vodra (Vanderbilt), who presented comparative data on GR-S with various fillers, with the aid of slides. A general discussion on GR-S compounding followed the speaker's address. During the course of the meeting it was announced that Richard Harmon, formerly in the rubber laboratory at the Mare Island Navy Yard, had been transferred to Washington, D. C. Plans for the coming Christmas party were discussed, and nominations for 1945 officers were made. Prizes, in the form of war stamps, donated by Deke Maddy (Hycar), were won by E. P. Coxhead (Pioneer Rubber Mills) and Griff Oliver (Oliver Tire), respectively.

Bauer & Black, Chicago, is starting an expansion program on land adjoining its property. The planned construction is to include a 3-story factory, a one-story building, and an extension to be added to the present plant.

Latex-Coated Metals in Demand

Postwar demands for synthetic latex-coated metals will increase in volume as civilian manufacturing is resumed, if the trend indicated by the present demand

continues, according to a statement made by the U. S. Rubber Co. Applications of latex to metal are currently applied to filter-press plates, rayon mass tubes, airplane and auto steering wheels, marine lamp guards, perforated plates for airplane cooling systems, and other military applications. These items are being covered with a required thickness of latex which is being made from several types of synthetics, with neoprene and Buna S found to be particularly satisfactory.

Chicago Holds Indiana Night

"Indiana Night" was celebrated by the Chicago Rubber Group at its regular meeting held on November 17 at the Morrison Hotel in Chicago, Ill. Approximately 225 members and guests were at the meeting which featured a discussion of the Chrysler continuous injection molding and extruding machine given by Don Fraser, Manager, Rubber Division, Monroe Auto Equipment Co., Monroe, Mich. In his talk, Mr. Fraser explained the mechanics of the new machine and outlined its specific advantages in the molding of small rubber parts. He illustrated his talk with well-prepared slides and showed samples of rubber and plastics parts the machine is making and can produce. (EDITOR'S NOTE: A complete description of the Chrysler machine by Mr. Fraser appears elsewhere in this issue.) Toward the close of the meeting, copies of the new 1945 Year Book published by the group were presented to the members.

Hutchinson Rubber Changes Name

Hutchinson Rubber Co., Hutchinson, Minn., manufacturers of mechanical goods, inner tubes, and tire repair materials, has changed its name to the Twin City Rubber Works, and has moved its plant to 111 So. 2nd Street, Minneapolis, Minn.

MOUNTAIN-TOP GALES USED TO TEST AIRPLANE DE-ICERS

The windswept summit of Mt. Washington in New Hampshire has been chosen by the B. F. Goodrich Co. as a testing-ground for airplane de-icers. An airplane wing, mounted like a weather vane so that it will head into the wind, has been erected on a tower 18 feet above the geographical summit of the mountain, where the wind velocities equal or approximate airplane speeds. Experimental de-icer models, which are powered by a compressor located within the tower, are installed on the wing.

The purpose of the Mt. Washington tests is to further study the physics involved in airplane ice removal, which has always been hampered by the difficulty of reproducing, where they can be conveniently studied, the great variety of icing conditions experienced in flight. The tests are being conducted by Dr. Dwight L. Loughborough, Goodrich research physicist.

Open New York Office

Tanney-Costello Co., dealers and brokers in all types of scrap rubber, with headquarters in Akron, Ohio, have announced the opening of a branch office at 70 Wall Street, New York 5, N. Y. The new office will be under the management of Robert J. Heiney. Mr. Heiney has had many years of experience in both the field of scrap rubber and in rubber manufacturing. He started as a compounder with the American Tire & Rubber Co. in 1919 and later was affiliated with the Triangle Tire & Rubber Co. and Mats, Inc. In 1939 Mr. Heiney organized the Dural Rubber Co. at Flemington, N. J., and operated as head of that concern until recent months.

Los Angeles Elects Officers

The recent mail ballot of the Los Angeles Rubber Group, Inc., resulted in the election of the following officers for the 1945 season: Chairman, R. E. Hutchinson (Firestone); Associate Chairman, C. M. Reinke (Reinke, Hiller & Amende); Vice-Chairman, C. R. Wolter (U. S. Rubber); Treasurer, P. R. Wineman (Goodrich); Secretary, C. H. Churchill (B. E. Dougherty). The following were elected to the board of directors: E. L. Royal (H. M. Royal), P. W. Drew (Goodyear), and Vic Vodra (Vanderbilt).

Montreal Meets on January 12

The next meeting of the Rubber and Plastics Division of the Montreal Section of the Society of Chemical Industry will be held on January 12, at the Ritz-Carlton Hotel, in Montreal, Canada. The main speaker of the evening will be Dr. J. G. Mark, of the Dewey & Almy Chemical Co., Cambridge, Mass., who will address the group on "Tailor-Made Polymers."

INCREASE OF PASSENGER TIRES PREDICTED BY FIRESTONE HEAD

The doubling of passenger car tire production next year and a civilian demand for at least 70,000,000 such tires in the first 12 months after the war were forecast recently by John W. Thomas, chairman of the board of the Firestone Tire & Rubber Co., Akron.

Mr. Thomas explained that while the number of tires which can be built for civilians in 1945 cannot be determined until the needs of the Armed Forces have been established, production emphasis is expected to shift back to civilian tires shortly after the defeat of Germany. He also warned that although doubling of present production would make available for replacement purposes more tires than the industry has sold in any recent peace-time years, the demand for tires still could not be fully satisfied.

The Firestone executive also said that the production of passenger tires will be near 18,000,000 this year, which compares with 33,465,000 replacement passenger tires sold in 1939. By contrast, more than 45,000,000 tires, now or shortly needed, will be ready for replacement. In 1942 only 2,607,000 passenger tires for civilians were produced.

Mr. Thomas further stated that "to increase passenger tire output, however, will not constitute a major problem. The men and much of the equipment now producing military tires can be speedily converted to civilian use." He also pointed to the $75,000,000 expansion program still under way as one of the most optimistic notes in the civilian tire outlook.

Mr. Thomas based his production forecasts on a careful analysis by the Firestone marketing research department, and on the premise that Germany will be defeated within the next few months.

SAE War Engineering Meeting

The War Engineering-Annual Meeting of the Society of Automotive Engineers will be held at the Book-Cadillac Hotel in Detroit, Mich., January 8 to 12, 1945. A tentative program has already been arranged and a complete program will soon be furnished. Several papers of direct interest to the rubber industry will be presented. On Monday, January 8, E. F. Riesing, of Firestone Industrial Products Co., will discuss "Synthetic Rubber in Automotive Chassis—Status and Future Possibilities," while W. J. McCortney, of the Chrysler Corporation, will talk on the "SAE Rubber Classification." At one of the sessions scheduled for Friday, January 12, T. H. Peirce, of the H. A. King Co., will talk on "Bonded Rubber Torsional Vibration Dampers for Diesel Engines," while Dr. J. J. Wydler, of the National Supply Co., will lead a prepared discussion on that paper.

Develops New Passenger Tire

The first newly-designed passenger car tire created by a major tire company since the war started has been announced by the B. F. Goodrich Co.,

Akron. Called the Mud-Snow Silvertown, the new tire is made with a tread having a button-bar design, which replaces the former super-traction casing in the company's line. The tire is being produced, at present, in the 6.00-16 four and six ply, 6.25/6.50-16 six ply and 5.25/5.50-17 four ply sizes. According to Goodrich, the Mud-Snow Silvertown has been designed for both use on and off the highway, and has a non-directional tread which gives equal traction forward or backward. It is also said to be self cleaning, in that the wide, open tread does not clog with mud or snow or pick up gravel or stones.

Dedicate New General Plant

The new tire plant of the General Tire & Rubber Co. at Waco, Texas, was formally dedicated on November 13. Officials of the company participating in the dedication ceremonies included William O'Neil, president, and L. A. McQueen, C. J. Jahant and W. E. Fouse, vice-presidents. The new plant, which is under the management of Joseph F. Sloate, will eventually produce 3,000 tires per day. It has a 200-foot frontage and a 950-foot depth, and is built of reinforced construction. It is completely air-conditioned, and boasts such other features as complete fluorescent lighting, which is obtained through scientific distribution of 2,200 new industrial lamps.

Issue Dedication Brochure

Midwest Rubber Reclaiming Co., East St. Louis, Ill., has issued a special brochure in commemoration of the dedication of its new research laboratory at the East St. Louis plant which was held on June 27, 1944. The brochure contains photographic reproductions of some of the dedication day activities, in addition to the company's officers and directors, and the laboratory, production, sales and office staffs. Some representative views of the new laboratory facilities are also included.

NEW RAYON TIRE CONSTRUCTION ASSURES INCREASED PRODUCTION

A new principle in rayon tire construction which provides stronger synthetic rubber truck tires and assures substantially greater tire production, has recently been revealed by Dr. Sidney M. Cadwell, director of tire development for the U. S. Rubber Company. Known as the "2200 denier" rayon type, the new development consists of using stronger but fewer plies in the tire, Dr. Cadwell said. The new construction greatly reduces serious blow-outs, he stated, which formerly placed a tire beyond the possibility of repair.

The 2200 denier rayon tire has twice the number of filaments twisted together as the 1100 denier, Dr. Cadwell explained, which was the standard type previously used in conventional tires, and which the 2200 denier now replaces in certain sizes of tires. Due to the greater strength of the heavier rayon, tires built of the 2200 denier are stronger than those built of the lighter 1100 denier. As a result, blow-outs are reduced to a minimum. Further, the stronger individual rayon cords reduce rupture spread, thus making it possible to repair injured tires by recapping, an important factor in truck tire conservation.

In addition, the new construction will materially aid in increased truck tire production, according to Dr. Cadwell, because fewer operations are involved, and materials and component parts are reduced. A stronger eight ply tire can thus be produced in place of the conventional 10-ply tire formerly made, and similarly, a better 10-ply made in place of the standard 12-ply tire.

Haaland Named Vice-President

E. Lund-Haaland, who has been associated wtih the Peters Bros. Rubber Co., Inc., of Brooklyn, N. Y., since 1936 as cost accountant and office manager, has been named vice-president and general manager of that company. Born in Norway, Mr. Haaland came to the United States in 1919 and for several years engaged in the field of industrial organization, serving at one time with the Aluminum Company of America. Prior to joining Peters Bros. he spent ten years in South America for the Cerro de Pasco Copper Corporation.

Changes at General Cable

Factory managers at the various plants operated by the General Cable Corporation have undergone some changes in recent weeks and the following are now located at the plants listed or will soon be placed at such locations: *Bayonne,* W. Vincent; *Buffalo,* L. F. Buckman; *Emeryville,* G. W. Cassell; *Pawtucket,* A. S. Watson; *Perth Amboy,* S. A. Smith; *Rome,* C. W. Potter; *St. Louis,* A. M. Hagen.

SPONSOR CONTEST ON USE OF SYNTHETIC SCRAP RUBBER

The Chicago Rubber Group is sponsoring a cash prize contest for the best papers on "The Utilization of Cured Synthetic Scrap Rubber." This problem is of vital interest to the rubber industry and it is hoped that the contest will stimulate interest in this subject and result in many worthwhile suggestions. The selection of subject matter for the papers is left to the discretion of the authors. The papers should be based on information which has not previously been presented before any technical meeting or published in any trade magazine.

The utilization of cured synthetic rubber is a subject of broad scope and authors may submit papers on any phase of the problem. Some of the headings under which the subject may be handled are: (1) Separation and segregation of Synthetic Scrap Rubber; (2) Methods of identification of Synthetic Scrap Rubber; (3) Reclaiming of Synthetic Scrap Rubber; (4) Compounding studies which will result in greater use of reclaimed Synthetic Scrap Rubber; (5) Compounding studies which will result in greater use of Ground Synthetic Scrap Rubber.

Anyone in the United States or Canada may submit a paper. Officers and directors of the Chicago Rubber Group for 1943-1945 may not compete. The contest will close on midnight of August 1, 1945. First prize will be $500, Second prize $300 and Third prize $200. Awards will be made at the time of the Fall Meeting of the American Chemical Society in Chicago in 1945.

Each author shall submit three copies of his paper to Mr. A. R. Floreen, Vice-President, City National Bank and Trust Co., 208 S. La Salle St., Chicago 90, Ill., who will assign a number to each paper and forward one coded copy to each judge. The papers shall contain no information that may identify the author.

Three judges will pass on the merits of each paper. One judge will be selected by the Rubber Manufacturers Association, another by the Rubber Reclaimers Association, and the third by the Rubber Division of the American Chemical Society. The judges will report their findings to Bruce W. Hubbard, Chairman of the Chicago Rubber Group, 2512 W. 24th St., Chicago, Ill.

Allen Honored by Brazil

Douglas Allen, who recently resigned as president of the Rubber Development Corp., was awarded the *Cruzéiro do Sol* decoration by the Brazilian government on November 25, for his services in rubber development in the Amazon valley. On accepting the award, Mr. Allen said that after Germany was defeated, the "battle of rubber" would continue, because natural rubber was badly needed to mix with synthetic rubber.

Adams to Head A.C.S.

Prof. Roger Adams, head of the Department of Chemistry at the University of Illinois, has been elected chairman of the board of directors of the American Chemical Society. He succeeds the late Thomas Midgley, whose death by strangulation a few weeks ago has since been revealed as suicide. Prof. Adams is a past president of the Society and is now on leave from the University of Illinois to serve with the National Defense Research Committee in Washington, D. C.

FINANCIAL NEWS

Columbian Carbon Co.

Nine Months: Consolidated net earnings of $2,315,426, after all charges, including provision of $1,225,000 for estimated Federal income taxes, which is equal to $4.31 a share, and compares with a net of $2,022,219, or $3.76 a share, for the corresponding period of 1943. Net sales for the period were listed at $17,190,133, which compares with $15,095,735 for the similar period of last year.

Raybestos-Manhattan Co.

Nine Months: Net profit of $1,307,628, after provisions of $5,504,000 for taxes and $730,000 for post-war adjustments and contingencies, which is equal to $2.08 a share, and which compares with a net of $1,279,239, or $2.04 a share, after provisions of $5,005,000 for taxes and $575,000 for post-war adjustments, contingencies and renegotiation, for the similar period of 1943.

Thermoid Company

Nine Months: Net profit of $481,180, subject to renegotiation, after provisions of $100,000 for contingencies and $92,000 for year-end compensation, which is equal to 86c a common share, and compares with a profit of $535,623, after year-end compensation reserves of $191,000, or 98c on a smaller number of shares outstanding, in 1943.

United Carbon Co.

Nine Months: Net profit of $1,489,724, which is equal to $3.75 a share, which compares with a net profit of $1,340,590, or $3.37 a share, for the corresponding period of the previous year.

Anaconda Wire & Cable Co.

Nine Months: Net profit of $922,770, which is equal to $2.19 a share on 421,981 shares of outstanding stock. No comparison with the corresponding period of the previous year is available.

SYNTHETIC TRUCK TIRE TREADS TESTED BY GOVERNMENT FLEET

A small number of S-5, 9.00-20, rayon truck tires were recently tested by the Rubber Reserve Co. on the Government Tire Test Fleet at San Antonio, Texas, for the purpose of comparing daytime operation from 10:00 A.M. to 10:00 P.M. with nighttime operation from 10:00 P.M. to 10:00 A.M. The tires were switched twice a day in such a manner that one group of tires was run only during the daytime while a similar group was run only at night.

The comparison of atmospheric temperatures for the day and night runs are as follows:

	Day	*Night*
Average	84°F.	75°F.
Maximum	100	90
Minimum	70	59

While the extent of this test was limited, and the results are not considered as conclusive, nevertheless, it is believed that the data obtained is accurately indicative of the variation in tire service between day and night operation. The tread wear mileage for the tires run during the daytime is only 86, as compared with 100 for the tires run at night. The ratio of total inches of tread cracking for the tires run during the daytime was 380 as against 100 for the tires operated at night. Therefore, it appears that night operation results in slower wear and less tread cracking than daytime operation.

While it is realized that these facts are generally known, the Rubber Reserve Co. feels that the release of this specific comparison may be helpful in furthering an increase in ratio of night driving in over-the-road trucking operations, where practical, in order to increase tire mileage.

L.A. Holds Theatre Party

The Third Annual Christmas Theatre Party of the Los Angeles Rubber Group, Inc., was held at the Wilshire Ebell Theatre on December 5, with approximately 660 members and guests in attendance. Special entertainment was provided, featuring Dick Lane, Ray Wilbert, Arlene Harris, Ravel, Marion Daniels, and Jack Norworth and Company. Prizes for the evening were purchased by the group and distributed during the evening. In addition, attractive key chains were presented to each lady present through the courtesy of E. L. Royal of H. M. Royal, Inc. During the program the new officers, elected by mail ballot (as reported elsewhere in this issue), were introduced from the stage. The retiring officers presented Al Pickard, of the Braun Corp., the retiring chairman, with a pen and pencil set in recognition of his excellent services during the year. Although many of the members cooperated in making the theatre party a huge success, special credit is due to Miles Reinke, Ed Royal and Al Pickard.

NAMES IN THE NEWS

JAMES E. POWER, former assistant manager of branch sales for the mechanical goods division of the U. S. Rubber Co., has been appointed eastern sales manager of that division. He has been with the company since 1906.

RALPH T. URICH, who has served as chief of the Synthetic Resins Section, Protective Coatings Branch, Chemical Bureau, War Production Board for the past year and a half, has rejoined Reichhold Chemicals, Inc., in the capacity of sales manager of the chemical color division. He will make his headquarters at the company's plant in Brooklyn, N. Y.

J. ROY PRICE, who has been assigned to technical sales with the plastics division of the Bakelite Corp., New York City, since 1936, has been appointed division manager of Vinylite plastics film and sheeting for consumer goods by that company. He has been active in the research, development and sale of Vinylite plastics since 1927.

E. T. FOOTE, vice-president of Globe-Union, Inc., Milwaukee, Wis., has been re-elected president of the Association of American Battery Manufacturers, Inc.

CAPT. RAYMOND E. RYAN, who served as chief inspector of rubber footwear for the Army's Boston (Mass.) Quartermaster Depot from 1933 to 1942, and who since 1942 has been purchasing and contracting officer for rubber footwear for that Depot, has returned to civilian life, and has been named New England representative for the Lima Cord Sole and Heel Co., Lima, Ohio.

RICHARD E. METZGER, former chemist for the Pittsburgh Testing Laboratories, Inc., has been appointed research chemist for the General Tire & Rubber Co., Akron.

MONTAGUE A. CLARK, who served as manager of industrial and public relations of the Detroit plant of the U. S. Rubber Co. from 1930 to 1943, and who more recently has been director of the War Manpower Commission for the State of Michigan, has joined the management engineering division of the Labor Relations Institute, Detroit, Mich.

E. R. BRIDGWATER, manager, Rubber Chemicals Division, E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., recently wrote a brief report on the status of synthetic rubber for the Associated Press. The report has been appearing in newspapers throughout the country.

R. J. HARTMAN, vice-president in charge of sales and a director of the Imperial Oil & Gas Products Co., Pittsburgh, Penna., has resigned from that organization.

JOHN T. STAKER, formerly manager of the tire conservation department of the B. F. Goodrich Co., has been named Pacific Coast manager of that company's International Division. He will make his headquarters in San Francisco.

JOHN E. POWERS, who has been acting as manager of the New York branch of the General Tire & Rubber Co., has been assigned to special duties on the executive sales staff of the company at the Akron headquarters.

A. R. BERMAN, who has been connected with the Associated Rubber Products Co., Quakertown, Penna., as general manager, resigned from that company as of November 30.

ROBERT P. KENNEY, formerly chief of the vinyl resins unit of the WPB Chemicals Bureau, has been named manager of International Service of the Chemical Division of the B. F. Goodrich Co., Akron.

E. O. UPHAM, formerly manager of the Montreal mechanical rubber goods factory of the Dominion Rubber Co., was recently appointed manager of the company's central industrial engineering department.

R. E. S. GEARE, formerly vice-president of the L. H. Gilmer Co., Philadelphia, is currently associated with the Norwalk Tire & Rubber Co., Norwalk, Conn., in the capacity of consulting engineer in connection with that company's installation and operation of an improved V-belt department.

FRED CASE, factory manager of the Essex Rubber Co., Trenton, N. J., was made a member of Loyal Lodge No. 181, F. & A. M., on November 16.

W. H. "BILL" BEARDSLEE, formerly associated with the McDonell Aircraft Co., has joined the engineering staff of the General Tire & Rubber Co., Akron, as project engineer in charge of aircraft wheels and brakes.

IRVING HOCHSTADTER, who has been serving as research administrator and technical director for the Gallowhur Chemical Corp. for the past year, has left that organization and is now acting as a chemical consultant, with offices at 52 Vanderbilt Ave., New York City.

Crosby Heads Thiokol Corp.

J. W. Crosby

Joseph W. Crosby, who has been serving as vice-president and general manager of the Thiokol Corporation since the death of Bevis Longstreth, one of the founders, in March, 1944, has been elected president and a member of the board of directors of that company. Born in Toronto, Canada, Mr. Crosby was formerly associated with Gutta Percha and Rubber, Ltd., of that city in charge of development and planning on mechanical rubber goods. In the course of his work there he became interested in the Thiokol Corporation, and in 1936 resigned his position with Gutta Percha to become field representative for Thiokol, contacting rubber manufacturers throughout the United States and Canada. In 1941, with the expansion of the company, Mr. Crosby became sales manager and held that position until he was appointed general manager of the company. Dr. S. M. Martin, Jr., succeeds Mr. Crosby as sales manager.

GEORGE B. SCHWAB, former treasurer and director of the Aspinook Corp., has been elected treasurer and director of the Heyden Chemical Corp., New York City.

E. RALPH ROWZEE, who has been general manager of Canadian Synthetic Rubber, Limited, has been appointed director of research of the Polymer Corp. of Canada. C. H. MADSEN, former factory manager of Canadian Synthetic Rubber, succeeds MR. ROWZEE as general manager.

DAVID F. SMITH, associated with Johnson & Johnson, New Brunswick, N. J., for many years, has been appointed director of laboratories, replacing G. S. MATHEY, whose recent illness has necessitated relinquishing some of his past duties.

LOS ANGELES NEWS

The Plastic and Rubber Products Company, at this writing, aims to have its new plant at Dayton, Ohio, in operation by January 15. The new plant involves 10,000 square feet of floor space, the entire first floor and a portion of a second floor. The location is Oak Ridge and Delphos Avenue.

Equipment at the beginning will consist of two mills, twelve presses, complete tool and die shop, and fully equipped laboratory. Molded rubber and plastic products, precision products for the most part, will be manufactured. The Dayton location was chosen quite largely because of Wright Field.

The executive vice-president in charge of operations at Dayton will be H. G. Taylor, and the firm name will be Plastic and Rubber Products, Inc. Arthur Meyring will be secretary, and William Kiefaber, treasurer. All these are residents of Dayton. The president will be MacNeel Pierce of Los Angeles, and the executive vice-president in charge of products and engineering will be N. O. Hulsey of Los Angeles. Tom Keenan of Los Angeles will be the consulting chemist.

The growth of the Plastic and Rubber Products Company has been quite phenomenal in Los Angeles. Going into business only three years ago the plant has a large plastic as well as rubber department. It occupies a fine new building. In the plastic department there are three injection presses and four compression presses (the latter group just now being installed), while in the rubber plant there are two mills and twenty-six presses. Precision molding has made the installation of the company's own tool and die department very necessary.

During the past several months Mr. Keenan has made several trips to Dayton and was due to be in that city again on January 15.

The Pacific Molded Products Company, of which V. S. Anderson is proprietor, has moved into new and larger quarters involving 28,000 square feet, at 905 East 59th Street, Los Angeles, moving from the former location at 6620 McKinley Avenue. The new location gives space for all the operations of the company, including warehouse space. Operations were previously scattered in three locations. Mr. Anderson's first assistant is W. L. Korber.

The new factory building is of brick construction, with first and second floors. The firm manufactures a general line of molded rubber goods.

Ed Royal and T. Kirk Hill, with their families, spent the Thanksgiving holiday at Palm Springs.

At this writing a number from the Los Angeles Rubber Group, Inc., have made arangements to attend the dinner-dance meeting of the Northern Rubber Group to be held at the Orina Hacienda in Orina, California, on December 18. Among those slated to make the trip north are Walter Boswell (Thiokol), Bob Abbott (C. P. Hall), Vic Vodra (Vanderbilt), Claus Vonder Reith (Sierra), and D. C. Maddy (Hycar). The Northern Group has gone along well since it was organized.

Sir Frank Beaurepaire, world famed rubber man of Australia, and former Lord Mayor of Melbourne, arrived in Los Angeles on Wednesday, December 6, and spent a week in Los Angeles and environs. Sir Frank had stopped in Los Angeles in October when on his way to the eastern coast of the United States and to England. On this trip he was on his way back to Australia.

Form Rubber Labor Committee

The War Production Board has announced that plans have been completed for the early creation of twelve new labor advisory committees, including one on rubber products, in addition to the nineteen already functioning. These committees assure labor a more extensive participation in advising how to expand war production and in post V-E Day reconversion proposals. While the main purpose of these committees is to familiarize labor groups with continuing WPB programs and to get labor's recommendations for increasing military production, they also suggest activities to the Board to speed the processes of reconversion after war programs have been met.

Report on Export Surcharge

According to a special bulletin issued by the Rubber Manufacturers Association, representatives of the industry have held several conferences with officials of the various government agencies concerned with the FEA order under which exporters would be required to pay 17½ cents per pound surcharge of natural and government synthetic rubber content on all export shipments other than lease-lend. The bulletin states that the R.M.A. has been officially advised that the surcharge payment will be applied only to tires, tubes and camelback and that the effective date will not be earlier than January 1, 1945. Procedures for the application of the surcharge payment will be officially announced shortly.

Goodrich Takes New Option

The B. F. Goodrich Co., Akron, has taken another option on a site for their proposed new research laboratory. The new option was taken on a large tract of land in Avon Lake, seven miles east of Lorain, Ohio, and that village has already adopted amendments to its zoning ordinance to clear the way for industrial construction. Goodrich also holds an option on land in Brecksville, Ohio, where a referendum vote, recently held, amended the city ordinances to allow industrial construction within the city limits. Goodrich officials have made it clear that no site has been decided upon, as yet, and that no construction work would be started until next year.

Chicago Exposition Successful

The Third National Chemical Exposition, held in Chicago, Ill., from November 15 to 19, under the auspices of the Chicago Section of the American Chemical Society, was termed a most successful exposition, with innumerable new products and developments displayed to large crowds. It is estimated that some 5,000 visitors viewed the exhibits daily during the five-day event. Highlight of the exposition was the dinner meeting held on November 17 at which C. F. Kettering, vice-president of the General Motors Corp., discussed the current contributions of the chemist and the chemical engineer to the war and to American living standards.

Piccovol Plasticizer

A coal tar type softener and plasticizer, called Piccovol, which was developed especially for crude, reclaimed and synthetic rubbers, has been introduced by the Standard Chemical Co., Akron 8, Ohio. Piccovol is a liquid at 40° F., dark in color, with a specific gravity of 1.09 and a flash point of 110° C. It is reported to give improved tear resistance, higher tensile, greatly improved elongation, and improved aging to GR-S formulations.

Acquires Textile Finishing Co.

The H. W. Butterworth & Sons Co., Philadelphia, one of the oldest and largest manufacturers of textile finishing machinery in the country, has announced its purchase of the Textile Finishing Machinery Co. of Providence, R. I. The latter company went into receivership in November, 1943, and was acquired by Jacob Ziskind. The plant at Providence will be continued in operation as a division of the Butterworth organization.

Additional "E" Awards

The Army-Navy "E" award for production efficiency has been granted in recent weeks to the Akron Presform Mold Co., of Akron, and the Aldan Rubber Co., of Philadelphia, Penna. In addition, a second star, indicating continued efficiency, has been awarded to the Converse Rubber Co., Malden, Mass.

POST-WAR PRICE OF 10.7c SEEN FOR SYNTHETIC RUBBER

A prediction that synthetic rubber can be produced on a peace-time basis at 10.7c per pound, as against the pre-war market price of 22c a pound for natural rubber, was voiced by Dr. Waldo Semon, director of research of the B. F. Goodrich Co., Akron, before the National Industrial Chemical Conference in Chicago on November 16.

Dr. Semon made it clear that the 10.7c figure applied to the "most efficient plants" only, since the average cost for the GR-S produced thus far is 34 cents. The anticipated after-war cost estimate represents "out-of-pocket" cost only, without allowing for amortization and profit. He also tempered his quotation of the low figure with a reminder that most of the world's plantation rubber, in the 1935-38 period, could have been delivered in this country at 12.2 cents a pound, "at present our lowest out-of-pocket cost for synthetic rubber."

For security purposes and regardless of economic factors, there should be a minimum annual production after the war of 200,000 tons of synthetic rubber, Dr. Semon said. Beyond that minimum, he said, it "must justify itself on both a quality and cost basis," and he foresaw the synthetic rubber industry in this country following a pattern similar to that of the synthetic dye industry, which has gone far beyond the possibilities ever offered by any of the natural dyes.

Admitting that GR-S "may not be the best synthetic rubber which could be made for every purpose," the Goodrich researcher said that in the future there might be one type of synthetic specifically tailor-made for inner tubes, another for coating the cords in tire carcasses, another for sidewalls and still another for the treads.

Stresses Advantages of GR-S

The speaker stated unequivocally that "GR-S is better than the best German synthetic, Buna S; easier to mix and handle, easier to build into finished products, and those products give better performance in service." He cited the fact that Germany was "never able to use more than about 50 per cent Buna in tires, whereas the 'S-3' tires on our cars today contain less than one per cent natural rubber."

The future role to be played by German scientists and engineers, "who will be the greatest assets that country has left after the war," was described by Dr. Semon as a question that must be handled carefully. He warned against the possibility of their being "driven underground, to plot sabotage, deviltry and revenge," and said that those who are again willing "should be given a chance to work, this time not for Nazi Germany, but for the common wealth of the world."

New Assault Gas Mask

Comparison between the new assault gas mask and the older type service mask is illustrated by these two fighting men in light combat packs at Fort Adams, Massachusetts. The assault mask (left)

is a complete unit itself with the canister attached directly to the face blank on the left cheek. The new mask permits effective and accurate rifle fire during a gas attack. The neat synthetic rubber, water-proof carrier is attached at a convenient and out-of-the-way position on the left hip of the wearer, which permits freedom of movement in action. The new assault mask is not only lighter and worn in a convenient spot, but the new rubber carrier, opened and closed in a flash, is watertight and has buoyancy approximately equal to that of the famed Navy "Mae West" life vest. The assault mask, pioneered and developed in the Fall River, Massachusetts, plant of the Firestone Rubber & Latex Corp., in cooperation with the Chemical Warfare Service Development Laboratory of the Massachusetts Institute of Technology, has been in mass production many months and was carried by our soldiers during the invasion of Normandy.

Bolton Named Perkin Medalist

Dr. Elmer K. Bolton, chemical director of E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., has been awarded the Perkin Medal for 1944 of the American Section of the Society of Chemical Industry. The award was made for his leadership in the synthesis of the first general purpose synthetic rubber to be developed either in this country or abroad, and for his direction of nylon research. Presentation of the medal, conferred annually for outstanding achievement in industrial research, will be made on January 5, 1945, at a joint meeting of the Society for Chemical Industry, the American Chemical Society, the American Institute of Chemical Engineers, the Electrochemical Society, and the Societe de Chimie Industrielle, at the Hotel Commodore, New York City.

EUROPEAN TIRE PLANT AIDS IN THE INVASION OF GERMANY

A dramatic sidelight on the close ties and swiftly coordinated movements on the European front and in American factories was revealed on November 29 by executives of the Goodyear Tire & Rubber Co. in Akron. The story is this:

With the capture of Belgium, an undamaged tire plant fell into the hands of the American forces. Tires and recaps for the offensive were vitally needed. Precious time would be saved by bringing the Belgian plant into production. This word was flashed back from the front to Army Ordnance in Washington. Immediately needed was a four-ton shipment of synthetic rubber, tire fabric, compounding chemicals and solvents so that new tires could go into production and damaged tires could be re-capped.

Within six hours after the needs were outlined to Goodyear executives in Akron by Major R. E. Bolton, of Detroit's Army Ordnance office, and Captain Baxter Wood, of Washington, the materials, carefully boxed and wrapped, were in trucks headed for Cleveland Airport, 30 miles away, where planes were waiting. The shipment was flown to the eastern seaboard, immediately transferred to Army transport planes, and flown directly to Belgium in a matter of hours.

Following closely on the heels of this first shipment went a second shipment of ten carloads of tire material by fast train and fast ship. Presumably, the tire building machinery in the Belgium plant, so recently abandoned by the enemy, is now producing for the needs of the armies of the European theater. With immediate requirements met in this manner, succeeding shipments of materials will follow in less spectacular manner to keep the Belgian plant operating for the Allies. Following normal procedure, shipments of this kind would require at least thirty days for confirmation, assembling and shipping.

(EDITOR'S NOTE: It has since been learned that tests made in French tire factories with American-made synthetics have proved successful and the Army plans to put foreign tire facilities to work as fast as it can furnish rubber to the plants. Although some new tires will be made, most of the plants will be put to work retreading truck tires which otherwise might have to be discarded. Experts count on these plants to handle approximately 125,000 tires for the Allied armies in the next six months.)

Pharis Tire to Expand Plant

Approval of expansion for its Newark, Ohio, plant has been extended to the Pharis Tire & Rubber Co. by the Regional War Production Board at Cleveland, Ohio. The company will expand its boiler house to include a new boiler and auxiliary equipment. In addition, it will add mixers, mills, pumps and other processing equipment to its plant facilities.

CANADIAN NEWS

Although the use of special synthetic rubber has been extended in the United States and supplies of the product have been made available to the Canadian market, stocks of elastic thread in Canada will not show a marked improvement until at least February or March of next year because of initial production difficulties, officials of the Textile Administration of the Wartime Prices and Trade Board report.

The over-all synthetic rubber supply situation in the U. S. has improved in recent months as a result of restrictive use in war contracts and increased new production. American synthetic rubber has become available to Canada but processing facilities can be brought back into operation only gradually and labor shortages limit Canadian production. An allocation of several thousand pounds of elastic thread was made this fall from the United States. Combined with limited Canadian production this has been sufficient to meet essential requirements.

It is planned to increase Canadian output by diverting skilled labor to the rubber cutting and braiding industries where acute labor shortages have restricted production. Steps are also being taken to secure full production of one Canadian extruding plant which was formerly limited to sporadic production by shortages of raw materials.

At the present time addditional allocations of elastic are being made available to Canadian manufacturers of children's underwear, and it is expected that before long all allotments to essential uses will be increased. Pending improvements in Canadian output, cut thread will continue to be imported from the United States.

The civilian use of elastic thread is determined by the Elastic Allocation Committee which allocates production to various essential uses according to their essentiality. The committee, composed of representatives of industry and the Prices Board, has established the following categories of essentiality which may be altered from time to time: (1) Mending, (2) Orthopedic and medical goods, (3) Children's underwear, (4) Children's outerwear, (5) Women's foundation garments, and (6) All others.

Over 800,000 synthetic rubber tires for essential civilian uses have been made this year by Canadian plants, but the ordinary motorist must wait at least until the defeat of Germany before getting new tires, according to officials of the Department of Munitions and Supply.

"This more than 800,000 production is considerably better than 1943, but it is still not enough to meet all our civilian requirements," it was said. "But once the war with Germany is over, there is a good prospect for an easing of the situation, and the release of synthetic passenger car tires to the public." There was no promise, however, that the supply of tires which might be available for general distribution after victory in Europe would be sufficient to meet the demands of rubber-hungry motorists.

Canada, which used 60,000 tons of natural rubber in 1941, has had to do with 10,000 tons this year. That represents 20% of normal consumption. Twenty-five per cent of the rest was reclaim rubber and 55 per cent synthetic.

George Sawin, president of the B. F. Goodrich Co. of Canada, presided at ceremonies held on November 22 when ground was broken for a $1,000,000 addition to the company's King Street west plant at Kitchener, Ontario. The new plant will comprise a three-story building and will be used for the manufacture of tires, tubes and other rubber products. Approximately 20% additional personnel will be required to operate the new plant when completed. Farm service tires will be made at the plant for the first time in Canada.

The confidence of Goodrich in the future of Canada and in the future of Canadian industry was expressed by Mr. Sawin at the ceremonies. He added that "as a company, we are proud to play our part in helping to further develop the production capacity of this great country." B. M. Costello, Goodrich vice-president, who also participated in the ceremonies, stated that the new building and the changes that will be made in production facilities will result in many benefits to the employees as well as to the company.

New regulations regarding the price, sale and delivery of tire reliners and patches are incorporated in Administrator's Order No. A-1460, recently issued by S. Godfrey, Used Goods Administrator of the Wartime Prices and Trade Board. The new order went into effect on November 17 and replaced Administrator's Order No. A-191, as Amended.

Under the terms of the order, which defines patches, pulled cord patches and reliners, "no processor shall, without permission from the Administrator, sell or offer for sale any reliners or patches except to tire manufacturers, jobbers or dealers."

The order also states that the number of reliners and/or patches which any processor may sell or deliver to any purchaser during any three months' period shall not, without permission in writing of the Administrator, "exceed the number which he sold and delivered to the same purchaser during the corresponding three months of 1943."

R. J. Thomas, president of the Seiberling Rubber Co. of Canada, Ltd., Toronto, has been elected president of the West Toronto Kiwanis Club. He takes office on January 1.

In recognition of the increasing importance of plastics products in a multitude of industries, Hobbs Glass, Limited, Montreal, has announced appointment of T. H. Yates as head of its plastics sales division. Mr. Yates joined Hobbs two years ago after eleven years in the mechanical rubber business with Goodyear Tire and Rubber Co. of Canada, Ltd.

The directors of Dunlop Tire and Rubber Goods Company, Limited, announce that dividends have been declared as follows: Two and one-half per cent on the 5% Cumulative Redeemable First Preference Shares for the half year ending 31st December, 1944, payable 30th December, 1944, to shareholders of record at the close of business on 15th December, 1944, and $1.25 per share on the Common Stock for the year 1944, payable 21st December, 1944, to shareholders of record at the close of business on 15th December.

As a large number of common shares are held in Great Britain, after giving due consideration to the financial position of the company, the common dividend has been increased over previous years at the instance of the Canadian Exchange Authorities. The Foreign Exchange Control Board has pointed out to the company that such action would increase the amount of purchasing power available here to the United Kingdom, thus reducing the British deficit of Canadian dollars to be financed from such sources as Mutual Aid.

Volunteers $1,500,000 Refund

It was recently announced that the International Latex Corp., Playtex Park, Dover, Del., has made voluntary and unasked for refunds to the United States Treasury of more than $1,500,000 representing profits on war contracts, as a contribution toward the winning of the war. The company, which went on a wartime production basis one day after the attack on Pearl Harbor, manufactures specialized and secret war materials, the inventions of its president, A. N. Spanel. The company is also running a series of editorial advertisements on a national scale, designed to help all phases of the war effort.

The Royal Electric Co., Pawtucket, R. I., has purchased the fuse division of the Colt's Patent Fire Arms Manufacturing Co., Hartford, Conn.

OBITUARIES

Walter H. Juve

Walter H. Juve, one of the most popular and widely known independent rubber consultants, who maintained headquarters in Akron but who spent part of each week in Washington as a consultant to the Office of the Rubber Director and more recently its successor, the WPB Rubber Bureau, died of a heart attack suffered in his office at Washington on December 13. Mr. Juve's attack was attributed to a combination of overwork and mental strain, resulting from a series of personal tragedies in recent months, including the loss of a son killed in action and the death of his mother. He was 54 years of age.

Born in Tacoma, Washington, in 1890, Mr. Juve was graduated from the University of Wisconsin in 1913. Immediately thereafter he joined the B. F. Goodrich Co. in Akron and after one year as a works chemist he was transferred to the development department. In the succeeding years he had charge of compounding, development, construction, and process engineering in various mechanical goods departments of the company, as well as of compounding and development in the tire division. At one time he served as technical superintendent of the hard rubber division.

On April 1, 1930, Mr. Juve left Goodrich to establish himself as a consulting rubber technologist and quickly established a reputation as being one of the best, especially in the field of hard rubber. Prior to the current war he had visited the synthetic rubber plants in Germany and was considered by many as one of this country's leading synthetic rubber technologists.

During his lifetime Mr. Juve secured many important patents. He was a constant contributor to the technical literature, and was an active member of the Rubber Division, A.C.S., and the A.S.T.M. He was also a member of the Portage Country Club. A widow, one son and daughter survive.

Hugh T. Keating

Hugh T. Keating, who was affiliated with the H. W. French Co., crude rubber brokers of New York City, and who served as vice-president of that company from 1931 to 1942, died suddenly of a heart attack on November 24 at his home in Whitestone, L. I., N. Y. He was 56 years of age.

Born in Ogdensburgh, N. Y., on December 18, 1888, Mr. Keating spent his entire lifetime in the crude rubber business. After receiving his primary education at St. Mary's Academy in Ogdensburgh, he joined the firm of W. R. Grace & Co. in New York in 1906 as a junior member of its import department and subsequently was made assistant to the vice-president. He remained in the New York offices until 1915 and the following year operated his own office in Akron handling the sale of rubber in that area for the Grace company.

In August, 1916, Mr. Keating was sent to London, England, by Grace to manage its London office and in this position he trained juniors and opened branch offices for the company throughout the world. He resigned from the Grace company in 1922 to enter a partnership dealing in rubber, coal and other commodities, withdrawing from it the following year. From 1924 to 1926 he served with the H. W. French Co., and in 1928 was admitted to membership in the New York Rubber Exchange. From 1930 to 1931 he was associated with L. W. Dumont & Co., and in the latter part of 1931 he rejoined French as a vice-president.

Funeral services were held on November 27 at St. Luke's Roman Catholic Church in Whitestone, with interment in Mount St. Mary's Cemetery in Flushing. A widow survives.

Sir John Campbell

Sir John Campbell, who served as chairman of both the International Rubber Regulation Committee and the International Tin Committee, died at his home near Radlett, England, on December 3 at the age of 70. Sir John, who was knighted in 1925, was born in Dunoon, Scotland, in 1874, and received his education at Glasgow University and Christ Church, Oxford. He entered the Indian Civil Service in 1897 and retired in 1922. He held several important posts in the Service including that of under-secretary to the Government of India. After leaving India, he served as financial officer of the University of London and from 1930 to 1942 acted as economic and financial adviser to the British Colonial Office. At one time Sir John served as vice-chairman of the Greek Refugee Settlement Commission.

William F. Gammeter

William F. Gammeter, president of the W. F. Gammeter Co., of Cadiz, Ohio, manufacturers of calender stock shells and other metal specialties for the rubber industry, died on October 31 after a brief illness at the age of 75. Born in Akron in 1871, Mr. Gammeter had been engaged in the manufacture of metal specialties for the past forty years. Funeral services were held on November 2 at his Cadiz home. A widow, two sons and three daughters survive.

Sam Baron

Sam Baron, chemist and manufacturer of synthetic rubber substitutes, whose most recent headquarters were maintained at 27 West 3rd Street in New York City, died on November 12 at the Harkness Pavilion of the Medical Center in New York from an aggravated asthma condition. He was 65 years of age.

Born in Lodz, Poland, Mr. Baron left that country as a youngster and went to Germany where he became affiliated with the rubber industry while still a youth. He came to the United States in 1904 and worked with some of the rubber companies in the Trenton area, but after a short stay he returned to Germany where he worked with the Meyer-Cohn Co. in Hanover and later established his own business, making heels and soles among other products. He was also associated with Dr. Alexander and was credited with some technical developments in the rubber reclaiming field.

Prior to returning to the United States to take up residence a few years ago, Mr. Baron spent some time in Belgium. Shortly after his return to this country he began the manufacture of synthetic rubber substitutes and by-products. Funeral services were held on November 13. A son, Jack, is among the survivors.

Chester F. Parish

Chester F. Parish, head of the advertising firm of Chester Parish Associates of New York City, which handles the advertising of several accounts closely allied to the rubber industry, including the Binney & Smith Co., H. Muehlstein & Co., and Titanium Pigments Corp., died in the Caledonian Hospital in Brooklyn, N. Y., on December 9 at the age of 62. Death was attributed to a heart attack. Starting his career as a reporter on the *New York Times*, Mr. Parish was later associated with other New York papers, including the old *Herald*, the *Evening Post*, the *Sun* and the *Tribune*. He was regarded as an advertising specialist and was the author of a textbook on that subject. An alumnus of Williams College, Mr. Parish was a director of the Bankers Federal Savings and Loan Association and a member of a Brooklyn Selective Service board.

William G. Kither

William G. Kither, vice-chairman of the board and former managing director of the Goodyear Tire & Rubber Co. of Australia, Ltd., died recently of a heart attack, at the age of sixty-four. A member of the Goodyear-Australia organization for 28 years, Mr. Kither retired from active duty on May 1 of this year, but retained his position as vice-chairman of the board. He had been managing director of the Australian company since 1921. A widow survives.

RUBBER
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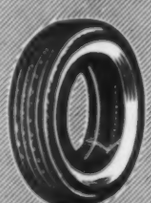
SYNTHETIC RUBBER
★
PLASTICS

THE Schuster
MAGNETIC CALENDER GAUGE
SAVES THAT MATERIAL



For upwards of 15 years, the Schuster Magnetic Calender Gauge has unerringly set rubber calender rolls to a predetermined thickness and correctly maintained that thickness. It has saved the time of hand-miking, eliminated human error, saved the stock sampled for calender tests, and assured uniform thickness in the finished product.

All this, *at the right time—before* damage is done. And *continuously*—the only way worth while.

The instrument is simple in design . . . rugged in construction . . . practically without wearing parts . . . adjustable to any thickness. Originally used for rubber, it has taken over just as deftly for synthetic rubber, plastics, cellulose, and other media. No matter what the article, your coating must be thick enough, but not even 1/1000" too thick, or the war effort suffers irreparable loss. No matter what the material, you've got to s-t-r-e-t-c-h it as far as possible—and "possible" daily proves to have a new, elastic meaning.

Better investigate the Schuster Magnetic Calender Gauge at once, with or without automatic control. Every installation has to be engineered to the job . . . Please *give us time to do it right.*

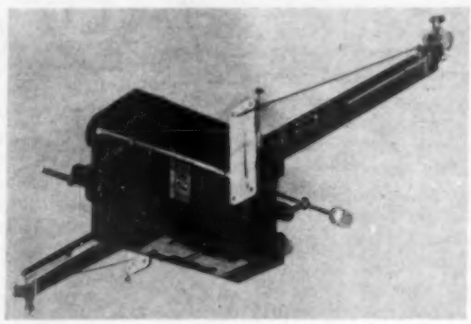
Ask for our bulletin on the Schuster Magnetic Gauge.

THE MAGNETIC GAUGE COMPANY
60 EAST BARTGES STREET AKRON, OHIO
Eastern States Representative—
BLACK ROCK MANUFACTURING CO., Bridgeport, Conn.

NEW EQUIPMENT

New Baldwin Southwark Jig

A simple, inexpensive new jig, which is said to speed and facilitate the direct determination of compression yield strength of a single sheet of material, has been developed and introduced by the Baldwin



Southwark Division of the Baldwin Locomotive Works, Philadelphia, Penna. When the jig is used the sheet is restrained from lateral deflection by a number of small rollers. Extensometers are attached to the edge of the sheet. The jig is described as a real time-, trouble-, and labor-saver for the laboratory.

Improved Delmhorst Moisture Detector

The development of a new Delmhorst Moisture Detector for lumber and wood products and various other materials, including rubber, has been announced by the Colloid Equipment Co., Inc., 50 Church St., New York, N. Y. The improved model takes advantage of the latest ideas in electrical circuits and electronic principles, all of which have been simplified and combined in a practical meter which covers the range of 7 to 25% moisture, with an accuracy of plus or minus 1%. Known as the Model R Detector, the new model is complete and self-contained. It is used by forcing the electrode needles into the material being tested and the reading is then taken by simply turning the dial knob until a small light above the dial flashes at the correct moisture content.

Micro Jet Air Brush Coater

Considerable interest is being expressed throughout the trade in the new Micro Jet Air Brush Coater that has been designed by the John Waldron Corporation, of New Brunswick, N. J., and on which patents are pending. It is generally known that this Micro Jet Coater embodies construction and operating features that constitute a major advance in the science of coating. One of these is the use of a solid air blade that planes the excessive coating to a precision controlled applied weight of coating material. In response to inquiries concerning its many other advantages B. R. Newcomb, president of the John Waldron Corporation, states that plans for introducing it are not yet completed but that full details on this new coater will be released for publication as soon as possible.

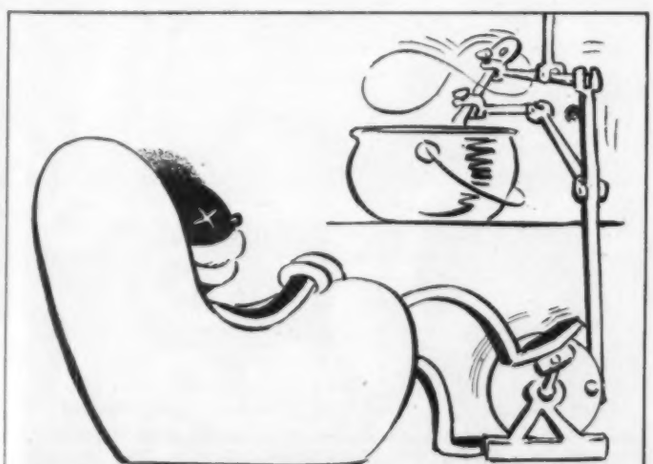
Watson-Stillman Molding Press

A new hydraulic molding press containing a top transfer cylinder and two rams is a recent addition to the line of molding machines produced by the Watson-Stillman Co., Roselle, N. J. The press, designed primarily for laboratory use, has an upward operating ram with capacity of 100 tons for general molding and a downward operating 30-ton ram for transfer molding at pressures of 6 to 30 tons. The "stop" and "up" and "down"operations for both cylinders are controlled by conveniently located push-buttons.

Pressure for the new press is supplied by two pumps—one for maintaining pressure on the main ram, the other a high-and-low variable delivery pump, driven by a 7½ h.p. motor. There are separate pressure and inching hand-wheel controls for both cylinders, controlled by push-buttons through solenoid-operating valves. The press has an operating speed for the main ram of 58 inches per minute, advance; 23 inches per minute, pressing; and 85 inches per minute, return. The top ram has a speed of 70 inches per minute advance and pressing, and 85 inches per minute, return. Platens measure 20 x 20 inches. The new press is 9 feet, 8½ inches in height, and occupies a floor space of 5 feet by 8 feet, 6 inches. It weighs 8,000 pounds.

A new line of metal-enclosed, high-voltage d-c **power supply units,** available in ratings up to 50,000 volts d-c, has been announced by the General Electric Co., Schenectady 5, N. Y. The units provide a convenient and reliable source of d-c power for miscellaneous industrial and electronic applications requiring a high-voltage d-c supply.

The sealing and insulating of refractory walls is said to be speeded up by a new type gun which syphons dry **Therm-O-Flake Insulation** direct from the shipping carton, mixes with water, and sprays to the refractory wall in one operation, thus eliminating premixing. Complete details are available from the Illinois Clay Products Co., 608 So. Dearborn St., Chicago 5, Ill.



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(FOR FURTHER DETAILS, SEE AD ON PAGE 232)

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●Yes—Plain water—in FIRE-FOG form now safely puts out a transformer fire moments after it starts—isolates the burning unit, guards the others from damage.

Let's assume that you've installed an "Automatic" FIRE-FOG System as protection against transformer fire hazards. What will happen if fire breaks out?

Instantly, automatically, FIRE-FOG nozzles "shoot" a mist-like spray at the fire, blanket the blaze completely—millions of water droplets hammer down the flames—cool the fire area. In an incredibly short time the fire is quenched

. . . and a costly conflagration—plant shutdown—production loss, are all avoided thanks to plain, ordinary water transformed into a potent all-around fire fighter by "Automatic."

★ YOUR FIRE HAZARD? You need a FIRE-FOG installation to protect your plant from such fire hazards as vapors from highly flammable materials, solvents used in rubber cements, rubber churns, calender machines for synthetics, and dryers. Write for full information—there's no obligation.

"AUTOMATIC" manufactures and installs a complete line of fire protection devices and systems for all types of fire hazards.

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YOUNGSTOWN, OHIO . . . OFFICES IN 31 CITIES

Test RUBBER PRODUCTS

— for WEATHERING and FADING with

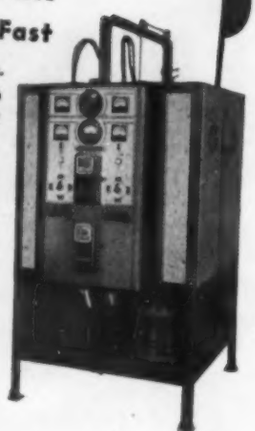
ATLAS-OMETERS

Twin-Arc WEATHER - OMETER

Tests Results Twice As Fast

The new Atlas Twin-Arc Weather-Ometer has been developed to save time where speed in testing is essential.

Where Federal Specifications call for a definite number of testing hours in the Atlas single arc Weather-Ometer, this time can be cut in half in the Atlas Twin-Arc.

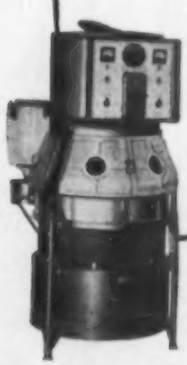


Exclusive Atlas Twin-Arc Weather-Ometer features:

1. Temperature control.
2. Unlimited range and control of Light and Water Spray Periods.
3. Adjustable and automatic timing.
4. Insulated test chamber.
5. Operates continuously 24 hours without manual attention.
6. Carbon cost 28c per day.
7. Full automatic—Safe to operate unattended overnight.
8. Control panel contains Volt and Ammeters — Time Meter—Light and Water Cycle switch—Automatic time cut off switch — Voltage adjusting switch — Direct reading thermal regulator — Reactance Coil (cut power cost in half).

The Single Arc Model is a popular machine where high speed is not required.

FADE-OMETER



The recognized standard machine of the textile trade for determining the light-fastness of materials. Specimens are rotated around the Atlas Enclosed Violet Carbon Arc—the closest approach to natural sunlight. Temperature of the filtered air is automatically controlled. Proper humidity is furnished by evaporation from a constant-level water reservoir. Available with a wide variety of specimen holders and exposure masks.

● Originators and sole manufacturers of accelerated testing devices for a quarter of a century. Fade-Ometer, Weather-Ometer, Launder-Ometer are used all over the world as accepted standard testing machines.

ATLAS ELECTRIC DEVICES CO.
361 West Superior Street, Chicago 10, Illinois

Tote-All All-Purpose Conveyor

The Tote-All Conveyor, a lightweight, portable endless belt type conveyor, has been introduced by the Tote-All Division of the Coaltoter Conveyor Co., 310 So. Michigan Ave., Chicago 4, Ill. It is said to be efficient for handling many conveying jobs in dozens of types of industries. The Tote-All Conveyor is available in two lengths—13 feet, 9 inches and 20 feet. Either model may be driven by an electric motor or a gasoline engine. The conveyor comes equipped with a 1½ h.p. gasoline engine, which is ideal for most conveying, or a 2.3 h.p. engine for heavy-duty work, or it may be had without power unit, where the user has his own motor. All models may be secured with a standard engine mounting or a high engine mounting for conveying bulky material. The engine mounting on models equipped with gasoline engine is adjustable to keep the engine level regardless of angle of conveyor. Normal belt speed is 420 F.P.M. Variable speed drive pulley is available if desired.

A new apparatus for rapid water analysis, known as the **Aero-Titrater,** a product of the Chief Chemical Corp., 1123 Broadway, New York 10, N. Y., is said to furnish plant operators and laboratory technicians with a rapid, precise method for the determination of hardness, calcium and magnesium in waters, both industrial and potable. It is also said to be applicable to water problems in the process industries.

The ball-bearing, springless dial mechanism of the double pendulum type, around which every **Kron Scale** is now designed and built, is said to speed weighing, counting, batching, measuring and testing operations by reducing these operations to a simplified "load and look" procedure. These scales are now made by the Yale & Towne Manufacturing Co., Philadelphia, Penna.

Research and development laboratories which have faced diverse and difficult problems with regard to d-c power supplies are said to have a distinct asset in the **Multi-Rectifier Unit** recently developed by the Green Electric Laboratories, 130 Cedar St., New York 6, N. Y. This new unit, which is reported to be a complete departure in terms of flexibility, allows for a range of from 0 to 48 volts in a compact mechanism.

A new plastic abrasive cleaning and scouring cloth, under the name of **Downite Abrasive Facing,** has been made available by the Downy Products Co., Orange, N. J. It is said to be exceptionally good for smoothing, leveling, or resurfacing wood, metal, and other surface areas; for removing accumulations of dirt-laden grease or oily metal filings around machinery areas; and for removing heavy soil and grease from the hands.

Castaloy Corporation, Detroit 17, Mich., has introduced a line of **processing tanks and kettles,** designed about the two basic principles of direct and indirect heating methods, with a choice of either gas or electricity as the heating medium, for the purpose of melting, blending and compounding of plastics and chemical formulations.

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Also coatings, impregnants, laminants; complete adhesives and formulations for compounding industrial adhesives.

Acrylic, Vinyl, Maleic, Phenolic, Styrene, Alkyd, Hydrocarbon, Cellulose Derivatives.

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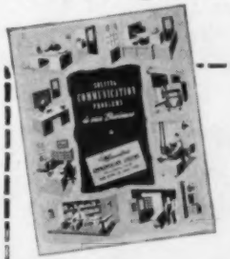
WORK FLOWS with greater smoothness—*greater speed*—from the moment you install EXECUTONE in your plant or office.

A mere press of a button places you in immediate voice-to-voice contact with any member of your organization—or with *several* at the same time! Reports are made—questions asked or answered—without a man leaving his desk, without a moment wasted. It's as easy, convenient and as personal as an across-the-desk conversation.

No more running back and forth from office to office. No more time-consuming delays while phones and buzzers go unanswered. EXECUTONE injects the split-second speed of electronics into inter-office communication . . . relieves your switchboard of "inside" traffic . . . quickens the pace and pulse of your whole business!

The U. S. Navy has selected EXECUTONE as the "inter-com" system for many of our fighting ships. It will take only a few minutes to show you EXECUTONE in your own place of business. No obligation to you.



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It may be your type of manufacture has not required the use of treated liners. However, such liners as you do use eventually have to be replaced.

Because of the stringent shortage of cotton piece goods at present, which shortage promises to last for some time, the obtaining of liner material is a very serious problem.

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Such consideration will relieve and solve one of your current emergency problems.

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Originators of the Capitol Process Liner Treatment

REVIEWS

BOOKLETS, CATALOGS, Etc.

1945 Year Book of the Chicago Rubber Group. Published by the Group (W. F. Bernstein, secretary-treasurer, 1 No. LaSalle St., Chicago 2, Ill.). 8¼ x 11 in. 48 pp.

This first year book issued by the Chicago Rubber Group is dedicated to "the advancement of rubber technology." For a first attempt it is a laudable issue, containing a good deal of interesting data. In addition to listing the 1944 officers of the group, as well as past chairmen, committees, and complete lists (with company connections and telephone numbers) of both Chicago and out-of-town members, the book contains data on rubber testing instruments manufactured in the Chicago area, tables and charts on the properties of various synthetic rubbers, a classification of carbon blacks by types, brand names, manufacturers and uses, and other information. The complete by-laws of the group are reproduced in the year book and some photographs taken at the group's last outing are shown. Commercial advertising is sprinkled liberally throughout the book.

•

Report on the Operations of Rubber Development Corporation. By Douglas H. Allen. Issued by Rubber Development Corp., Washington 25, D. C. 8 x 10½ in. 22 pp.

This report, submitted by the author upon his retirement as president, covers the operations of the Rubber Development Corporation, the government agency charged with the procurement of crude rubber, from February 23, 1943, the date of its formation, to August 31, 1944. It contains data on the amount of rubber acquired, cost per pound of rubber acquired, discontinuance or adjustment of certain projects (including the cryptostegia project), disposal of excess stocks in the United States, personnel, aviation activities, and the need for natural rubber. While the report is somewhat lengthy, it nevertheless represents only a relatively brief review of the more salient features of the operations of the government agency since its inception.

•

Vinylite Elastomeric Compounds: Bonding. Plastics Division, Carbide and Carbon Chemicals Corp., 30 East 42nd St., New York 17, N. Y. 8½ x 11 in. 16 pp.

The bonding of Vinylite materials is somewhat complicated by the fact that there are a number of types of Vinylite resins available. These may be formulated in different ways, and such formulations can be used to bond an extremely wide variety of materials. This booklet includes a summary of the standard methods for bonding Vinylite resin compounds, a general study of the adhesive materials employed, and detailed studies of formulas and methods for bonding Vinylite plasticized sheeting to itself, to metal, to ceramic surfaces, to leather, to wood, to concrete, to wallboard, to cloth, and to miscellaneous materials.

•

Care and Use of Synthetic Rubber Tires. (Maintenance Bulletin No. 41). Highway Transport Dept., Office of Defense Transportation, Washington, D. C. 8 x 10½ in. 18 pp.

This bulletin discusses use and maintenance practices which have the greatest effect on tire casing life. Also included is current information regarding the peculiarities of the synthetic rubber compounds now used in tire and tube manufacture. From this information about the nature of synthetic materials, truck or bus owners may gain a better understanding of the limitations of such materials and be able to do a better job in saving the tire casings which are available. Items which influence only tread wear are not discussed in the bulletin.

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REVIEWS (CONT'D)

The Carbon Spectrum for the Rubber Compounder. By C. W. Sweitzer and W. C. Goodrich. Columbian Carbon Co., 41 East 42nd St., New York, N. Y. 5¼ x 7¾ in. 32 pp.

Issued as Volume V, Number 5 of the "Columbian Colloidal Carbons" Series, this booklet is a reprint of the original material which was published in the August, 1944, issue of RUBBER AGE. It indicates that through the evaluation of three basic carbon properties by simple tests—pH, surface and structure—and by recognition of the effects of these properties in the behavior of carbons in rubber, the rubber compounder has the means for predicting fairly closely the behavior of any carbon of the spectrum in Hevea and GR-S rubber. The study also indicates that electrical conductivity, shown to be a derived rather than a basic property, correlates with electrical conductivity in rubber, provided two of the three basic carbon properties remain constant.

•

Centralized Systems of Lubrication. (Bulletin No. 25). Farval Corporation, 3295 East 80th St., Cleveland 4, Ohio. 8½ x 11 in. 16 pp.

How centralized lubrication systems increase the production output of machinery and at the same time make impressive savings in time, power and lubricating materials, is the theme of this new bulletin. An explanation of how the Farval measuring valve operates to deliver a measured amount of lubricant, and why it can accomplish this without recourse to springs, check valves or small ports, is made by means of cutaway drawings. Methods of locating and mounting pumping units and feed lines on many different kinds of machinery are outlined.

•

Nothing Takes the Place of Glycerine. Glycerine Producers' Association, 295 Madison Ave., New York 17, N. Y. 8½ x 11 in. 32 pp.

More than 1580 processes and compositions in which glycerine is a component are listed in this booklet, the first half of the list relating to glycerine uses in the material arts and sciences and the second half to what may be termed "human" uses. In addition, the chemical properties, physical properties and grades of glycerine available are discussed, while some of its major uses in drugs and pharmaceuticals, foods and beverages, tobacco and cosmetics are stressed.

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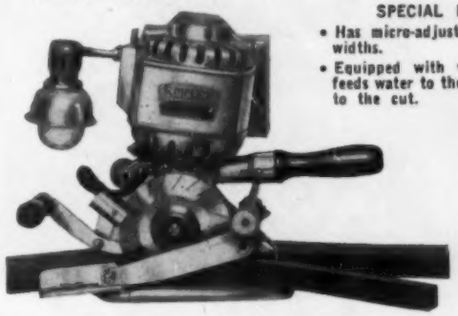

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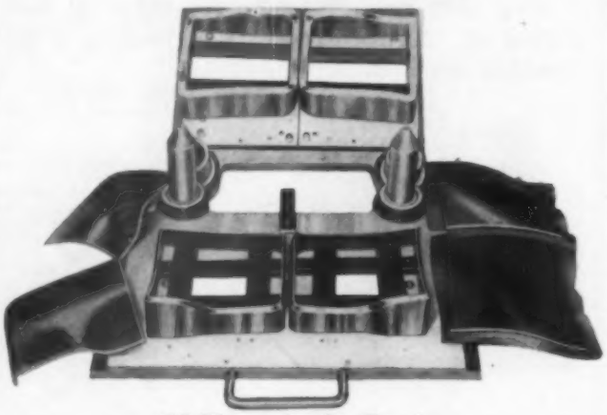

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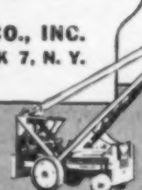

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REVIEWS (CON'T)

Statex No. 93. (Bulletin No. 131). Binney & Smith Co., 41 East 42 St., New York, N. Y. 8½ x 11 in. 3 pp.

The physical and chemical properties of Statex No. 3, the so-termed balanced HMF carbon, are outlined in this bulletin, while the use of the black in GR-S treads is discussed. Results of physical tests, including modulus, tensile, elongation, hardness and rebound, of two typical compounds, one containing 45 parts of an EPC black and the other 50 parts of Statex 93, are given. The results indicate that while tensile is somewhat lower for the Statex 93 stock, the excellent rebound secured assures a cooler running compound. Statex 93 is particularly recommended for GR-S treads to improve flex cut growth resistance.

•

Physical Properties Pertinent to the Storage of a Number of Commercially Important Liquids and Gases. (Bulletin 7,427-B). Pittsburgh-Des Moines Steel Co., Pittsburgh, Penna. 8½ x 11 in. 24 pp.

As indicated by the title, this is a tabulation of data on physical properties pertinent to the storage of a number of commercially important liquids and gases. Charts are included showing the variation in the specific heats in many of the substances listed, over wide temperature ranges, and in the gaseous, liquid, and solid phases. Several useful conversion factors are also included. References to the literature used in compiling the data are listed.

•

Speedaire Worm Gear Reduction Units. (Catalog No. 300.) Cleveland Worm & Gear Co., 3301 East 80th St., Cleveland 4, Ohio. 8½ x 11 in. 16 pp.

This catalog is virtually a comprehensive exposition of the company's Speedaire fan-cooled worm gear reduction units, with the Speedaire principle fully detailed by means of cutaway photographs, charts, diagrams and engineering tables. In addition to the explanatory and descriptive material which comprises the first portion of the catalog, carefully detailed instructions for planning installations of the units, with illustrative examples, are included.

•

Resins and the War (Revised). U. S. Industrial Chemicals, Inc., 60 East 42nd St., New York 17, N. Y. 8½ x 11 in. 44 pp.

This booklet contains revised government agency specifications for various protective coatings, together with the company's resins which are recommended for use in each case. Many changes have taken place in the protective coating requirements of the various government agencies since the first edition of the booklet was issued in April, 1943. The older specifications have been amended and many of the newer ones included.

•

History's Lesson to Air Power. By P. W. Litchfield. Goodyear Tire & Rubber Co., Akron, Ohio. 4¼ x 6½ in. 16 pp.

This is a reproduction in booklet form of a talk given by the author before a national conference of sales executives of the Goodyear Tire & Rubber Co. In it, the author traces the development of the means of transportation throughout history and shows their effect on the ways of war. He advocates a strong merchant marine of the air for the post-war United States to forestall attempts of the aggressor nations to again seek world domination.

•

Correct Wheel & Tire Combinations for 1944. Borbein, Young & Co., 3315 Locust Blvd., St. Louis 3, Mo. 8½ x 11 in. 24 pp.

Correct combinations of wheels and tires to match wide-base standards are presented in this publication. Special sections are devoted to demountable rims for truck and trailer wheels, wide-base wheels for light commercial cars, wide-base wheels for passenger cars, and miscellaneous sets for passenger and light commercial cars, calling for from 13 to 20 inch diameter tires.

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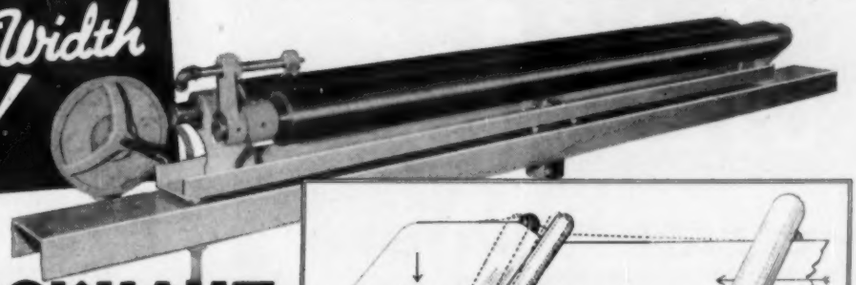

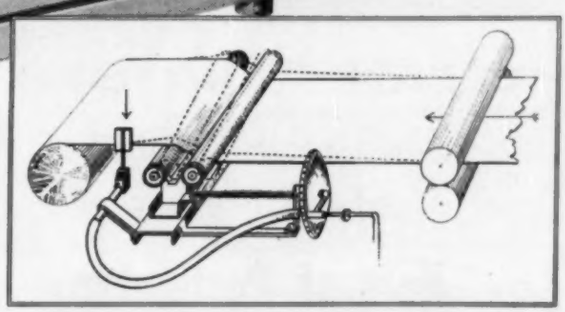

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This automatic control prevents waste of material and time. In scores of plants, the WALDRON-DICKHAUT AUTOMATIC TENSIONING WEB GUIDE is paying for itself many times over in the savings in breaks and shut-downs. A descriptive Bulletin No. 107 is available on request.

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Write for Bulletin 1805

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BARBER, NEW JERSEY

The Compounding of GR-S Latex Type No. 3. (Booklet No. 6A). R. T. Vanderbilt Co., 230 Park Ave., New York 17, N. Y. 8½ x 11¼ in. 8 pp.

As indicated by the title, this report presents information and data intended to answer some of the questions prompted by the steadily growing interest in the use of GR-S latex. It covers types of GR-S latex, the effect of vulcanizing GR-S latex films, antioxidants in light colored films, McNamee Clay as a filler, vulcanizing dispersions for GR-S latex, hard rubber from GR-S latex, and commercial GR-S latex compounds. The latter topic covers rug backing, upholstery backing, combining and canvas glove coatings.

•

Research in Action. Battelle Memorial Institute, Columbus, Ohio. 8½ x 11 in. 56 pp.

The major activities in the field of science conducted by the Battelle Memorial Institute, now celebrating its fifteenth year of service, are outlined in this pictorial report. Its work on minerals, fuels, metallurgy, welding, ceramics, chemistry, physics, etc., is discussed, and special equipment used by the various departments illustrated and described. The report points out that the amount of money annually invested in sponsored research projects at the Institute has increased from $80,000 in 1933 to an estimated $2,500,000 in 1944.

•

The Early Years. American Petroleum Institute, 50 West 50th St., New York 20, N. Y. 8½ x 11 in. 16 pp.

This is a story of the beginnings of the petroleum industry which has been issued in connection with the 85th anniversary of that industry, that milestone having been reached on August 27, 1944. The trials and tribulations of the early pioneers and the eventual success which crowned their efforts is briefly told. The petroleum industry dates its birth from August 27, 1859, when Colonel Edwin L. Drake brought in the first drilled well in the world on the banks of Oil Creek, near Titusville, Penna.

•

Heat Resistant GR-S. (Booklet No. 6). R. T. Vanderbilt Co., 230 Park Ave., New York 17, N. Y. 8½ x 11¼ in. 4 pp.

This report submits heat aging data on two sulfurless GR-S compounds, one vulcanized with Selenac and the other with Ethyl Tuads, both compounds containing Altax as a mild retarder for processing purposes. Physical data, including stress, tensile, elongation and Shore hardness, is given for press cures ranging from 20 to 120 minutes. Both compounds are reported to have remarkably good heat resistance.

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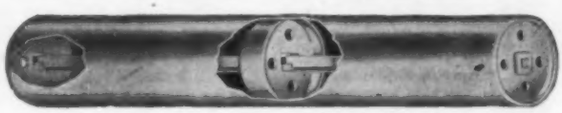

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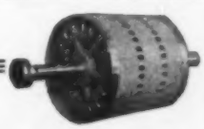

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Stearns magnetic clutches and brakes offer smooth, efficient operation with near or remote control. Bulletin 225.

Processing scrap rubber requires Stearns Magnetic pulleys or other types of magnetic separators. For economical, automatic, efficient protection against costly shutdowns due to tramp iron damage, Stearns Magnetic equipment will pay for itself many times over—a definitely profitable investment.

WRITE FOR BULLETIN 302

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MILLS, CALENDERS, HYDRAULIC PRESSES,
TUBERS, VULCANIZERS, MIXERS, ETC.
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MARKETS

Rubber – Crude, Reclaimed and Scrap – Cotton – Ducks – Tire Fabrics – Sheetings

NEW YORK, DEC. 12, 1944

Crude Rubber

AN urgent appeal for augmented production of natural rubber from all rubber growing areas has been issued by the Combined Raw Materials Board. The appeal was coupled with a warning that the overall rubber problem is far from solved and that Allied stocks of crude rubber are now at their lowest ebb. The appeal came as a surprise to the industry, since encouraging reports of increased shipments over and above conservatve estimates had been emanating from Washington for the past few months.

According to a statement issued by the CRMB, unfavorable weather in Ceylon, which is the largest single source of crude rubber for the United Nations, has eliminated expected gains in supplies, and at the same time less favorable reports are coming from the wild rubber areas of South America and Africa. The South American reports are particularly discouraging, in view of the fact that the added premium now allowed on crude rubber under the special agreements was expected to result in a sharply increased flow from that territory.

In addition, according to the statement, difficulties created by the less favorable crude rubber supply prospects have been aggravated by new urgent demands from France, Belgium, and other parts of liberated Europe. These countries must have both natural and synthetic rubber in order to resume the production of tires and other goods, desperately need not only for the war fronts but for local rehabilitation.

Prices shown below are ceilings set by the Rubber Reserve Company:

	C	N-C
Plantations—		
Ribbed Smoked Sheets, 1X	22½	40
Thick Pale Latex Crepe, 1X	22½	40
Thin Pale Latex Crepe, 1X	22½	40
Thick Brown Crepe, 1X	21⅜	38⅞
Thin Brown Crepe, 1X	21⅜	38⅞
Thick Remilled Blankets, #1	21⅜	38⅞
Rolled Brown or Flat Bark	18	35½
Smoked Blankets, #1	21⅛	38⅝
Claro Brand 1XRSS	22½	40
Sole Crepe Trimmings	22	39½
Sole Crepe	22½	40
Wild—		
Uncut Fines, Crude	15	29
Cut Fines, Crude	15½	29¾
Cut Fines, Washed & Dried	22½	40
Upriver Coarse, Crude	12¾	26⅛
Upriver Coarse, Washed & Dried	20¼	37¼
Caucho Ball, Crude	11¾	24¾
Caucho Ball, Washed & Dried	19½	37
Guayule—		
Carload Lots	17½	31
Less than Carload Lots	18	31½
Balata—		
Surinam Sheet	42½	42½
Manaos Block	38¾	38¾
Colombian Block	38¾	38¾
Peruvian Prime	38¾	38¾
Chicken Wire	23¼	23¼
Latex—		
Normal, Tank Car Lots	26	43½
Creamed, Tank Car Lots	26¾	44¼
Centrifuged, Tank Car Lots	27¾	45¼
Heat-Concentrated, Carload Drums	29½	47

C. for Civilian Use; N-C. for Non-Civilian Use.

Scrap Rubber

Calls for scrap rubber are reported to have fallen off somewhat in recent weeks as a result of fairly comfortable inventories maintained by reclaimers. In view of the fact that passenger tires accumulated during the nation-wide collection campaign two years ago have been virtually exhausted from the Rubber Reserve stockpiles, scrap rubber dealers look forward to greater activity in normal trade channels within the next few months. Some tonnage of truck and bus tires is said to remain in these government stockpiles, but even such scrap will probably be exhausted shortly. Sales of scrap by government agencies are reported to be fairly numerous, with premiums often being secured because of the nature of the scrap. Prices shown below are ceilings on typical grades of scrap:

(Prices to Consumers, Delivered Akron)

Mixed passenger tires	ton	$20.00
Beadless truck tires	ton	26.00
Mixed truck tires	ton	20.00
Beadless passenger tires	ton	26.00
No. 1 passenger peelings	ton	52.25
No. 1 truck peelings	ton	52.25
No. 2 passenger tubes	lb.	.07¾
Red passenger tubes	lb.	.07½
Black passenger tubes	lb.	.06¾
Mixed passenger tubes	lb.	.06½
No. 2 truck tubes	lb.	.07½
Red truck tubes	lb.	.07¾
Black truck tubes	lb.	.06½
Buffings	ton	35.00
Bicycle tires	ton	15.00
Air bags and water bags	ton	15.00
Boots and shoes	ton	33.00

Tire Fabrics

The situation in the tire fabric field remains unchanged, with practically no demand for such fabrics. Consequently, prices are nominal and in many quarters are not even being quoted. The prices shown below are those which were in force on or about January 15, 1942.

(Prices Net at the Mill)

Peeler, carded, 23/5/3	lb.	.43½ @	.44
Peeler, carded, 23/4/3	lb.	.44½ @	.45
Peeler, carded, 15/3/3	lb.	.41½ @	.42
Peeler, carded, 15/4/2	lb.	.41½ @	.42
Peeler, carded, 13/3/3	lb.	.40½ @	.41
CHAFERS			
Carded, American, 1 1/16"	lb.	.43½ @	.44
Carded, American, 1"	lb.	.39½ @	.48

Sheetings

48x40	36 in.	5.50	lb.	—	@ 8.272
40x40	36 in.	6.15	lb.	—	@ 7.398
40x36	36 in.	6.50	lb.	—	@ 7.000
48x48	40 in.	2.50	lb.	—	@17.200
48x48	40 in.	2.85	lb.	—	@15.087
56x60	40 in.	3.60	lb.	—	@12.638
48x44	40 in.	3.75	lb.	—	@11.733

Note: Prices shown above are ceiling prices set by order of the O.P.A. Quotations are based on an average price of 15-16-inch middling cotton at the ten designated southern markets.

Cotton

The price of middling uplands on the Cotton Exchange has swung in the narrow range of 25 points since our last report, high being 22.32 today (December 12) and low 22.07 on November 20. The average price for middling uplands for the month of November was 22.13, based on 23 trading days. The price took a downward trend in mid-November under heavy liquidation but later moved upward as the result of short covering and aggressive mill buying. It remained fairly static around 22.15 in early December but has given indication of higher levels in the past few days on the strength of the report that the government will make substantial purchases outside of its support program for Lend-Lease purposes. The Service Bureau of the New York Cotton Exchange has issued an estimate to the effect that the total consumption of all cotton in the United States during November amounted to 810,000 bales, which compares with 795,000 bales in October and 859,000 bales in November, 1943. Quotations for middling uplands on the Exchange follow:

	Nov. 14	December 12		
	Close	High	Low	Close
December	21.66	21.82	21.76	21.80
March	21.72	21.93	21.89	21.93
July	21.57	21.56	21.53	21.53

Reclaimed Rubber

Demand for reclaim continues at the same level as in recent months with reclaimers anticipating still higher demand within the next few months. Activity is reported from practically all branches of the industry, especially from heels and soles, battery boxes, sponge rubber, and miscellaneous mechanicals. The inventory of reclaimed rubber is reported to be fairly large, but not unwieldy, and experiments with synthetic scrap continue. Although natural rubber scrap is still in fair supply, it is realized that the time may come when synthetic rubber scrap may constitute a good portion of available supply. Prices shown below are ceilings on typical grades of reclaim:

Shoe			
Unwashed	lb.	.07¼ @	.07½
Tube			
Black Tube	lb.	.11½ @	.11¾
Red Tube	lb.	.12¼ @	.12½
Tires			
Black (acid process)	lb.	.07¾ @	.08
Black, selected tires	lb.	.06¾ @	.07
Truck, Heavy Gravity	lb.	.08¾ @	.09
Miscellaneous			
Mechanical blends	lb.	.04¾ @	.05¾
White	lb.	.13¼ @	.13½

Ducks

Enameling (single filling)	lb.	— @	.44¼
Belting and Hose	lb.	— @	.39
Single filling, A grade	lb.	— @	.19¾
Double filling, A grade	lb.	— @	.20¾

Since 1883 ★ ★ ★ ★ ★ ★

. . . . we at U. S. Rubber Reclaiming Company, Inc. have said "Merry Christmas" to a mounting host of friends and customers . . . whose loyalty to our Buffalo brands has constantly inspired our efforts and contributed so much to our success.

This year we say "Merry Christmas" again . . . with the deepest, most sincere wish that Christmas 1945 will bring true Peace On Earth, Good Will to All Mankind.

U. S. RUBBER RECLAIMING COMPANY, INC.

500 FIFTH AVE. • NEW YORK 18, N. Y. • (Plant at Buffalo, N. Y.)

AKRON . . . F. F. DUGAN, 907 Akron Savings & Loan Bldg.
TRENTON . . . H. M. ROYAL, Inc., 689 Pennington Ave.
TORONTO . . . H. VAN DER LINDE, Ltd., 156 Yonge St.

CHEMICAL MARKETS

New York, Dec. 12, 1944
All Prices F.O.B. Works

ACCELERATORS

Organic			
A-1 (Thiocarbanilid)	lb.	.28	.33
A-10	lb.	.36	.42
A-19	lb.	.52	.58
A-32	lb.	.60	.70
A-77	lb.	.42	.55
A-100	lb.	.42	.55
Aldehyde ammonia, crystals	lb.	.65	.70
Altax	lb.	.39	.41
Beutene	lb.	.59	.64
B-J-F	lb.	.34	.39
Butasan	lb.	—	1.10
Butyl Zimate	lb.	—	1.10
Captax	lb.	.34	.36
Crylene	lb.	.40	.47
Di-Ortho-Tolyguanidine	lb.	.44	.46
Diphenylguanidine	lb.	.35	.41
El-Sixty	lb.	.36	.43
Ethasan	lb.	—	1.10
Ethyl Tuads	lb.	—	1.25
Ethyl Zimate	lb.	—	1.10
Ethylidine aniline	lb.	.42	.43
Formaldehyde aniline	lb.	.31	—
Guantal	lb.	.39	.48
Hepteen	lb.	.34	.39
Hexamethylenetetramine	lb.	.33	—
Lead Oleate, No. 999	lb.	.13	—
Witco	lb.	.15	—
Ledate	lb.	—	1.20
Methasan	lb.	—	1.20
Methyl Tuads	lb.	—	1.25
Methyl Zimate	lb.	—	1.20
Monex	lb.	—	1.25
Pentex	lb.	.74	.84
Phenex	lb.	.49	.54
Pip-Pip	lb.	—	1.63
R & H 50-D	lb.	.42	.43
R-2 Crystals	lb.	—	1.55
Rotax	lb.	.44	.46
Safex	lb.	1.15	1.25
Santocure	lb.	.60	.67
Selenac	lb.	—	1.60
SPDX-G	lb.	.53	.58
Super-Sulfur No. 2	lb.	.13	.15
Thiocarbanilid, drums	lb.	.28	.33
Thiofide	lb.	.39	.46
Thiotax	lb.	.34	.41
Thiurad	lb.	—	1.25
Trimene	lb.	.54	.64
base	lb.	1.03	1.18
Triphenylguanidine	lb.	.45	—
Ulto	lb.	.99	1.04
Ureka	lb.	.50	.57
Blend B	lb.	.50	.57
Blend C	lb.	.48	.55
Vulcanex	lb.	.42	.43
Vulcanol	lb.	.85	—
Inorganic			
Litharge, domestic	lb.	.07	.07½
Magnesia, calcined, heavy	lb.	.04	—

COLORS

Blues [b]			
Prussian	lb.	.36	—
Ultramarine	lb.	.17	.27
Browns [b]			
Mapico	lb.	.1135	—
Umber, Turkey	lb.	.04¼	—
Greens [b]			
Chrome	lb.	—	.25
Guignet's Green	lb.	.70	—
Reds			
Antimony crimson, 15/17	lb.	—	—
Indian	lb.	.08¼	—
Domestic (Maroon)	lb.	.11	—
Mapico	lb.	.096	—
Red oxide, pure	lb.	.10	.12
Rub-Er-Red	lb.	.09¼	—
Whites [b]			
Cryptone No. 19	lb.	.0560	.0585
Cryptone CB No. 21	lb.	.0560	.0585
Cryptone ZS-800	lb.	.0825	.0850
Lithopone:			
Albalith	lb.	.04¼	.04½
Astrolith	lb.	.04½	.04½
Azolith	lb.	.04½	.04½
Ray-cal	lb.	.05½	.05¾
Rayox	lb.	.14½	.15¾
Titanox A	lb.	.14½	.14¾
Titanox B	lb.	.05¾	.06
Titanox C	lb.	.05½	.05¾
Zinc Oxide—American Process [b]			
American Azo:			
ZZZ (lead free)	lb.	.07¼	.07½
Anaconda, lead free	lb.	.07¼	.07½
Horsehead Lead Free Brand:			
Special—3	lb.	.07¼	.07½
XX Red—4	lb.	.07¼	.07½
XX Red—72	lb.	.07¼	.07½
XX Red—103	lb.	.07¼	.07½
Kadox, black label—15	lb.	.07¼	.07½
Red label—17	lb.	.07¼	.07½
St. Joe, black label	lb.	.07¼	.07½
green label	lb.	.07¼	.07½
red label	lb.	.07¼	.07½
U. S. P.—7, bbls.	lb.	.10½	.10¾
Zinc Oxide—French Process: [b]			
Florence White Seal—7 bbl.	lb.	.09½	.09¾
Green seal—8	lb.	.09	.09¼
Red seal—9	lb.	.08½	.08¾
Yellows [b]			
Cadmolith	lb.	.55	.60
Chrome	lb.	—	.50
Mapico	lb.	.071	—

[a] Price Ceilings.
[b] Prices Suggestions or Agreements.

BLACKS
(In bags, carload lots)

Arrow Compact	.0355@	—
Atlantic	.0355	—
Certified	.0355	—
Certified Spheron	.0355	—
Continental	.0355	—
Disperso	.0355	—
Dixiedensed	.0355	—
Dixiedensed 66	.0355	—
Excello	.0355	—
Furnex	.03½	.06
Furnex Beads	.03½	.06
Gastex	.03½	.06
Kosmobile	.0355	—
Kosmobile 66	.0355	—
Kosmos-Dixie 20 lb.	.03½	.06
Micronex (Amarillo)	.0355	—
Micronex Beads (Amarillo)	.0355	—
Pelletex	.03½	.06
P-33	.04 @	.06½
Philblack A lb.	.05 @	—
Shell Carbon (Del. Midwest)	.0240	—
Sterling	.035	—
Supreme	.0355	—
Thermax	.0225@	.05
Wyex	.0355	—

COMPOUNDING MATERIALS

Aluminum Flake ton	18.00	@24.50	
99½%-300 ton	—	@16.50	
86-90%-300 ton	—	@13.50	
Asbestine ton	16.50	@20.00	
Atomite ton	—	@27.50	
Barium carbonate (98-100%) ton	47.00	@49.00	
Barytes ton	25.35	@36.00	
Bentonite ton	11.00	@16.00	
Blanc fixe, dry ton	60.00	@67.50	
Calcene ton	37.50	@43.00	
Catalpo (fact) lb.	.02	—	
Clay, Aerfloted, Suprex ton	11.00	@23.50	
Aerfloted Paragon ton	10.00	@22.50	
Champion ton	—	@11.00	
Crown ton	—	@11.00	
Dixie ton	11.00	@23.50	
Kaolloid ton	—	@ 9.00	
Langford ton	—	@ 8.50	
Magnolia ton	—	@10.00	
McNamee ton	10.00	@22.50	
Par ton	—	@11.00	
Witco ton	10.00	—	
Kalite No. 1 ton	26.00	@52.00	
Kalvan ton	100.00	@126.00	
Keystone white ton	—	@14.00	
Magnesium carbonate lb.	.06¼	—	
Mineralite ton	—	@30.00	
Pyrax A ton	—	@ 7.90	
Rottenstone (powd. Dom.) ton	25.50	@37.50	
Rubberol lb.	—	@ .17½	
Silene EF (calcium silicate) lb.	.055	@ .06	
Silical ton	65.00	@85.00	
Snowflake white ton	—	@16.00	
Talc, domestic ton	17.00	@25.00	
Whiting, commercial ton	16.00	@26.00	
Witco ton	6.00	—	
Witcal ton	—	@100.00	
Witcarb R-12 ton	—	@40.00	
Wood Flour (100 mesh) ton	30.00	@32.00	

MINERAL RUBBER

285°-300° Mineral Rubber ton	25.00	@27.00	
Black Diamond ton	25.00	@27.00	
Dielex lb.	—	@ .06	
Hard Hydrocarbon ton	25.00	@27.00	
MilliMar lb.	—	@ .05½	

MISCELLANEOUS

Aromatics—Rodo #0 lb.	4.00	@ 4.50	
Rodo #10 lb.	5.00	@ 5.50	
Curodex 19 lb.	2.75	—	
Curodex 188 lb.	3.50	—	
Curodex 198 lb.	4.50	—	
Para-Dora lb.	4.50	—	
Aresklene No. 375 lb.	.35	.50	
Darvan (dispersing agent) lb.	.30	@ .39	
Santomerse S lb.	.11	@ .25	
Sponge Paste lb.	—	@ .18	
Sunproof lb.	.22¼	@ .27¼	
Tonox lb.	.50	@ .59	
Ty-Ply gal.	6.75	@ 8.75	
Unicel (blowing agent) lb.	.50	—	

SOFTENERS

Acids			
Acetic, 28%, bbls.[a] 100 lb.	3.38	@ 3.63	
Nitric, 36 degrees cwt.	5.00	@ —	
Acids, Fatty			
Laurex lb.	.14¾	@ .17¼	
SL-20 lb.	.11	@ .13	
Stearex Beads lb.	.10	@ .11	
Stearite lb.	.10	@ —	
Alkalies			
Caustic Soda, 76% cwt.	2.70	@ 5.70	
Soda Ash, 58% cwt.	1.15	@ 2.98	
Oils			
Degras, bbls. lb.	.10	@ .12	
Para-Flux gal.	.17	@ .18	
Para-Lube lb.	.046	@ .048	
Petrolatum, amber [b] lb.	.03¾	@ —	
Pigmentaroil, tank cars gal.	.20½	@ —	
in drums gal.	.26½	@ .27½	
Pine, tanks gal.	.55	@ —	
Rosin Oil, cmpd. gal.	.40	@ —	
Rubberol lb.	.13½	@ .14	
Rubtack lb.	.10	@ —	
Seedine, c.l. lb.	.07¼	@ —	
Witco Palm Oil lb.	—	@ —	
Witco Softener No. 20 gal.	.20	@ —	
Woburn No. 8, c.l. lb.	.06	@ —	
Resins and Pitches			
Pitch, Burgundy lb.	.06	@ —	
coal tar ton	19.00	@22.00	
hardwood ton	16.00	@22.50	
pine, 200 lb. gr. wt. bbl.	—	@ 4.50	
Pigmentar, tank cars gal.	.20½	@ —	
in drums gal.	.26½	@ .27½	
Retort Pine Tar, drums gal.	.26½	@ .27½	
Solvents			
Acetone, pure [a] lb.	.07	@ —	
Benzene, 90%, tank car gal.	.14	@ —	
Beta-Trichlorethane gal.	—	@ .20	
Bondogen lb.	.98	@ 1.25	
Carbon, bisulfide lb.	05	@ .08½	
Carbon tetrachloride gal.	.83	@ 1.27	
Dichlorethylene lb.	—	@ —	
Dipentene, cml., drums gal.	.48	@ .50	
Ethylene dichloride lb.	.07½	@ .08¼	
Plastogen lb.	.07¾	@ .12	
Reogen (drums) lb.	.11½	@ .15	
Rub-Sol gal.	.09½	@ —	
Trichlorethylene lb.	.08	@ .09¼	
Turpentine, spirits lb.	.78½	@ —	
dest. dist., drums gal.	.50	@ .55	
Waxes			
Antisol lb.	.22½	@ .23½	
Beeswax, white [b] lb.	.58	@ —	
Carnauba, yellow [b] lb.	.83¼	@ —	
Ceresin, white, dom. lb.	.13½	@ .15	
Montan, crude lb.	—	@ —	
Paraffin [a]			
Yellow crude scale, 124/126 lb.	.04¼	@ —	
Refined, 123/125 lb.	.05¼	@ —	

ANTI-OXIDANTS

Agerite Alba lb.	1.95	@ 2.05	
Gel lb.	.52	@ .54	
Hipar lb.	.61	@ .63	
Powder lb.	.40	@ .42	
Resin lb.	.43	@ .45	
Resin D lb.	.40	@ .42	
White lb.	1.23	@ 1.33	
Albasan lb.	.69	@ .74	
Antox lb.	.54	@ .56	
B-L-E lb.	.40	@ .49	
Flectol H lb.	.40	@ .47	
Neozone A, C, D, E lb.	.40	@ .63	
Oxynone lb.	.77	@ .90	
Retardex lb.	.44½	@ .47½	
Santoflex B lb.	.40	@ .47	
Santoflex BX lb.	.54	@ .61	
Santovar O lb.	1.15	@ 1.40	
S.C.R. lb.	.32	@ .34	
Stabilite lb.	.48	@ .50	
Stabilite Alba lb.	.69	@ .74	
VGB lb.	.43	@ .52	

EXTENDERS

Naftolen R-100 lb.	.10	@ .12	

LUBRICANTS—MOLD & RUBBER SURFACE

Aresklene lb.	.35	@ .50	
Cocoa Soapstock lb.	.06	@ .08	
Colite gal.	.90	@ 1.15	
Dipex lb.	.06	@ .08	
Glycerized Liquid Lubricant gal.	—	@ 1.35	
Lubrex lb.	.25	@ .30	
Mineralite ton	—	@30.00	
Sericite ton	65.00	@75.00	
Soap Tree Bark, cut, sifted lb.	.06	@ .08	

FACTICE OR RUBBER SUBSTITUTES

Amberex lb.	.25	@ —	
Amberex Type B lb.	.18¾	@ —	
Black lb.	.08½	@ .13	
White lb.	.09	@ .15	
Brown lb.	.10	@ .14	
Neophax A lb.	.16½	@ —	

VULCANIZING INGREDIENTS

Dispersed Sulfur No. 3 lb.	.08	@ .12	
Sulfur Chloride, yellow (drs.) lb.	.03	@ .08	
Sulfur, rubber makers			
Refined (bags) cwt.	2.55	@ —	
Commercial (bags) cwt.	2.20	@ —	
Telloy lb.	1.75	@ —	
Vandex lb.	1.75	@ —	
Vultac No. 1 lb.	.38	@ .43	
Vultac No. 2 lb.	.38	@ .43	
Vultac No. 3 lb.	.42	@ .49	

The WHERE-TO-BUY Section of THE RUBBER AGE in which are listed the Products and Services of the Leading Suppliers to the Industry.

The Market Place

If what you are seeking is not listed here, write to the Service Department of THE RUBBER AGE, 250 West 57th St., New York 19, N. Y.

Chemicals and Compounding Materials

ACCELERATORS—
El-Sixty; Ureka; Ureka C; Guantal; Santocure; DPG; Pip Pip; A-10; A-32; A-100; R-2 Crystals • ANTIOXIDANTS—Flectol H; Santoflex B, BX; Santovar O.
MONSANTO CHEMICAL CO.
Rubber Service Dept.
1012 Second National Bldg., Akron 8, Ohio

CARBON BLACK
"Atlantic" Carbon Blacks meet the exacting standards of modern rubber production.
Chas. Eneu Johnson & Co., Mfrs.
Distributed by
C. P. HALL CO.
Akron — Boston — Los Angeles — Chicago

CHEMICALS
For Natural & Synthetic Rubber "PICCO" Brand—Plasticizers; Coumarone Resins; Reclaiming Oils, Coal Tar Naphthas.
Pennsylvania Industrial Chem. Corp.
Clairton Penna.

AERO BRAND
RUBBER CHEMICALS
DPG—DOTG—Accelerator 49
Rubber Sulphur
American Cyanamid & Chemical Corporation
30 Rockefeller Plaza, New York 20, N. Y.

CARBON BLACK
DIXIE...KOSMOS
Used throughout the world
UNITED CARBON COMPANY
Charleston, W. Va.
New York • Akron • Chicago

CHEMICALS
A complete line of plasticizers, resins, substitutes, fillers, etc., for Synthetic, Natural and Reclaimed Rubber.
STANDARD CHEMICAL COMPANY
Akron 8, Ohio

ALUMINUM FLAKE
A uniform, fine, low gravity, white reinforcing pigment. *Furnished to the rubber trade for 41 years.*
The Aluminum Flake Co.
Akron, Ohio

CARBON BLACK
CONTINEX SRF—A New Semi-Reinforcing Furnace Black. *Now in Full Scale Production.*
Continental Carbon Co., *Mnfr.*
Witco Chemical Co., *Distributor*
295 Madison Avenue
New York 17, N. Y.

CHEMICALS AND MINERAL
Ingredients—Whiting, Clay, Talc, Barytes, Colors. Heavy Calcined Magnesia. Carbonate of Magnesia, Pumice Stone.
Standard Since 1890
Whittaker, Clark & Daniels, Inc.
260 West Broadway New York 13, N. Y.

ANTIMONY Pentasulphide, golden and crimson, very fine, pure.
Rare Metal Products Co.
Belleville, N. J.
Direct Factory Representation

CATALPO—The universal and standard rubber pigment now being used in treads, solids, tubes, carcass frictions, etc.
Moore & Munger
33 Rector Street New York 6, N. Y.

CHEMICALS
PIGMENTS
ASPHALTUMS
Witco Chemical Company
295 Madison Avenue
New York 17, N. Y.

CALCENE—SILENE EF
Two exclusive Columbia pigments proving exceptionally valuable to Rubber Compounders. Send for free data sheets.
PITTSBURGH PLATE GLASS CO.
COLUMBIA CHEMICAL DIV.
Grant Bldg., Pittsburgh (19), Pa.

CHEMICALS
Carbon Black—Clay—Colors
Accelerators—Sulphur
Stocks Carried At All Times
Ernest Jacoby & Co.
79 Milk St. Boston, Mass.
Cable Address: Jacobite Boston

CLAY
*CHAMPION
*MAGNOLIA
National Kaolin Company
Distributed by
C. P. HALL CO.
Akron — Los Angeles — Chicago

CARBON BLACK-MICRONEX
The world's standard gas black; universally known as the "King of Rubber Pigments."
BINNEY & SMITH CO.
41 East 42nd St. New York 17, N.Y.

CHEMICALS
From Coal Tar Bases—For Use As Antiseptics, Plasticizers, Reclaiming Oils, Softeners, Solvents, Tacifiers.
Koppers Company
Tar and Chemical Div.
Koppers Bldg. Pittsburgh, Pa.

COAL TAR CHEMICALS
Coumarone Resins — Tack Producers
Resinous Oils — Dispersing Oils
Reclaiming Oils — Softeners
Solvents
The Neville Company
Neville Island, Pittsburgh, Penna.

CARBON BLACK—Aerfloted
WYEX — TX — HX
Compressed — Compact (Dustless)
J. M. Huber, Inc.
460 West 34th St., New York 1, N. Y.

CHEMICALS

For Rubber		For Industry Generally
Accelerators	*Acids*	*Latex*
Antioxidants	*Oil of Myrbane*	*Lotol*
Specialties	*Aniline Oil*	*Dispersions*

NAUGATUCK CHEMICAL
Division of United States Rubber Co.
1230 SIXTH AVE. NEW YORK 20, N. Y.

COLLOIDAL SULPHUR
COLLOIDAL ZINC OXIDE
COLLOIDAL COLORS
HEVEATEX CORPORATION
78 Goodyear Ave. Melrose, Mass.
Offices in New York, Akron, Chicago

The Market Place

The WHERE-TO-BUY Section of THE RUBBER AGE in which are listed the Products and Services of the Leading Suppliers to the Rubber Industry. If what you are seeking is not listed here, write to the Service Department of THE RUBBER AGE, 250 West 57th St., New York 19, N. Y.

Chemicals and Compounding Materials {continued}

COLORS
BRILLIANT ORGANIC DYES; PERMANENT, NON-BLEEDING, LOW COST
For All Cures
MONSANTO CHEMICAL CO.
Rubber Service Dept.
1012 Second National Bldg., Akron, Ohio

COMPOUNDING Materials
Vulcanizing Agents — Pigments
Accelerators — Clays
Antioxidants — Mineral Rubber
Plasticizers — Aromatics
Dispersions — Blacks
R. T. VANDERBILT CO.
230 Park Ave. New York 17, N. Y.

CUMAR —Paracoumarone Resin.
A neutral gum for synthetic rubber compounding. *Laboratory test data, samples and prices on request.*
THE BARRETT DIVISION
Allied Chemical & Dye Corp.
40 Rector St., New York 6, N. Y.

DU PONT Rubber Chemicals
DU PONT RUBBER COLORS
DU PONT ACCELERATORS
DU PONT ANTI-OXIDANTS
E. I. du Pont de Nemours & Co., Inc.
RUBBER CHEMICALS DIVISION
WILMINGTON, DELAWARE

DUTREX
SHELL DUTREX 6—Plasticizer and Extender for GR-S
Chemically and Physically Controlled
Shell Oil Company, Inc.
50 West 50th St., New York 20, N. Y.

"FACTICE"—Prevents blooming, (Reg. U. S. Pat. Off.) makes colors fast and a smoother batch.
Stamford Rubber Supply Co.
Stamford, Conn.

FURNEX—FURNEX BEADS
The High Resilience Semi-Reinforcing Black
BINNEY & SMITH CO.
41 East 42nd St. New York 17, N. Y.

GASTEX
Special Process Reinforcing BLACK. Superior aging and oil resistant properties. Low permanent set.
Herron Bros. & Meyer, Akron, Ohio
General Sales Agents for
General Atlas Carbon
Pampa, Texas

IRON OXIDES
Asbestine—Barytes—Talc—Soapstone
C. K. Williams & Co.
EASTON, PA.

MAGNESIA
Calcined Magnesia—for neoprene
Carbonate of Magnesia—precipitated
The Philip Carey Mfg. Co.
Cincinnati Ohio

MAGNESIUM OXIDE
Calcined Magnesium Oxide prepared for use in the compounding of neoprene. Full details on request.
J. T. Baker Chemical Co.
Phillipsburg New Jersey

MAGNESIUM OXIDE
Extra Light—Original neoprene type
Also Light, Medium and Heavy types
General Magnesite & Magnesia Co.,
2960 East Venango St., Phila. 34, Pa.

MICA
"CONCORD" Wet Ground Mica
Its *White, Pure* and *Uniform*
Send for Samples and Prices
CONCORD MICA CORP.
Penacook Station Concord, N. H.

MOLD LUBRICANT
"Orvus" enables articles to leave molds readily; molds clean easily. Effective in hardest water. Also acts as thorough cleanser for molded and extruded rubber goods.
PROCTER & GAMBLE
Cincinnati Ohio

OROPLAST
Plasticizer—Sulphur Reactive
High Loading Tolerated
Great Elongation Produced
Cool Processing Stocks
Advance Solvents & Chem. Corp.
245 Fifth Ave., New York 16, N. Y.

PARA-FLUX
The Universal Softener—Adaptable, Uniform. Improves Quality—Economical.
The C. P. Hall Co.
2510 First Central Tower
Akron Ohio

PELLETEX (The pellet *Gastex*)
The special process reinforcing black in free-flowing form. Saves power; none wasted; protects adjacent colored stocks.
Herron Bros. & Meyer, Akron, Ohio
General Sales Agents for
GENERAL ATLAS CARBON
Pampa, Texas

PHILBLACK A
NEW HMF TYPE BLACK
Offers: Excellent Processing — Low Hysteresis, and High Abrasion.
Phillips Petroleum Company
Philblack Division
First Central Tower, Akron

RUBBER PROCESSING OILS
For outstanding compatibility in processing natural or modern synthetic rubbers, use
SUN RUBBER PROCESSING OILS
Write
SUN OIL COMPANY
Philadelphia Pennsylvania

RUBBER SUBSTITUTES
White, brown and black.
The Carter Bell Mfg. Co.
Springfield, New Jersey

SOFTENERS
Rosin Oil — Pine Tar
Burgundy Pitch
"Galex" — a non-oxidizing Resin
National Rosin Oil & Size Co.
RKO Bldg., New York 20, N. Y.

The Market Place

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Chemicals and Compounding Materials {continued}

SOLVENTS

"Skellysolve"—A superior solvent in six different types for various uses—for making rubber cements—for many different rubber fabricating operations.

SKELLY OIL CO., SOLVENTS DIV.
Skelly Bldg., Kansas City, Mo.

TITANIUM PIGMENTS
TITANOX

Unsurpassed in
OPACITY, WHITENESS, BRIGHTNESS
Titanium Pigment Corp., Sole Sales Agent, 111 Broadway, New York, N.Y.
104 South Michigan Ave., Chicago
350 Townsend Street, San Francisco
2472 Enterprise Street, Los Angeles

ZINC OXIDE PIGMENTS

The XX Reds Kadox

ZINC SULPHIDE PIGMENTS

The Cryptones The Albaliths (Lithopones)

The New Jersey Zinc Sales Co.
New York *Chicago*
Cleveland, Boston, San Francisco

STEARIC ACID

STEAREX . . . CAKE or POWDER
STEAREX BEADS
Standardized Products for Rubber Compounding
MINERAL RUBBER (Parmr), TALC
SOAPSTONE

BINNEY & SMITH CO.
41 East 42nd St. New York 17, N. Y.

WILCHEM PRODUCTS

NAFTOLEN • MULTIPLAST • ECONO-PLAST
WILMEX • NAFTEX • NAFTOLEN EMULSION
Unique - Efficient - Dependable

Wilmington Chemical Corp.
10 E. 40th St., New York 16, N. Y.

ZINC OXIDES

Black Label Red Label Green Label
Manufactured by Our New Electrothermic Process

St. Joseph Lead Co.
250 Park Ave. New York 17, N. Y.
Plant and Laboratory: Monaca (Josephtown), Pa.

SULPHURS

Rubbermakers' TIRE BRAND and TUBE BRAND. Also CRYSTEX Insoluble Sulphur, Sulphur Chloride, Caustic Soda, Carbon Bi-Sulphide, Carbon Tetra-Chloride.

Stauffer Chemical Company
2710 Graybar Bldg., New York 17, N. Y.

ZINC OXIDES

AZO ZZZ Zinc Oxides
lead free—pure—uniform—dependable
AZO ZZZ-11 AZO ZZZ-55
AZO ZZZ-22 AZO ZZZ-44 AZO ZZZ-66

American Zinc Sales Company
Columbus, Ohio *New York*
Chicago *St. Louis*

ZINC STEARATE
ZINC LAURATE

Colite Mold Lubricant for Extra High Gloss

THE BEACON COMPANY
87 Bickford St., Boston, Mass.

Machinery and Equipment

BANBURYS REPAIRED

Re-building and re-surfacing rotors and mixing chambers has been our specialty for years.

INTERSTATE WELDING SERVICE
914 Miami St. Akron, Ohio

CUTTING MACHINERY

Specialists in Rubber Cutting Equipment for Bands, Crude Stock, Jar Rings, Tubes, Rollers, Washers, Treads, Cement Stock, etc.
See Black Rock for All Cutting Problems

Black Rock Manufacturing Co.
179 Osborne St. Bridgeport, Conn.

FORMS - PORCELAIN

Exclusive Manufacturers of Vitreous Porcelain Closed End Forms
No matter what shape or design—we can make it. Send blue print or sketch for our prices.

The Colonial Insulator Co.
936 Grant St. Akron, Ohio

CALENDER SHELLS

Gammeter's
ALL STEEL Calender Shells.
All welded. Any size.
New and better.

The W. F. GAMMETER CO.
Cadiz Ohio

DIAL GAUGES—Thickness

For measuring the thickness of rubber and similar materials. Many models.

Frank E. Randall
248 Ash St.,
Waltham Mass.

GRINDING MILLS

SPAN grinding mill reduces soft and hard rubber to fine powder.
Made in U. S. A.

M. Pancorbo
155 John St. New York 7, N. Y.

CUTTING DIES

Cutting and perforating dies of all types for rubber manufacturers.
Send for our quotations

Brockton Cutting Die & Machine Co.
Avon, Mass.

DRYING MACHINERY

For Synthetic Rubber, Reclaimed Rubber, Latex Processed Materials, etc.

PROCTOR & SCHWARTZ, INC.
Seventh St. & Tabor Rd. Philadelphia, Pa.

MACHINERY—RUBBER

"Master" Tube Molds, Tire Vulcanizers, Molds and Cores, Tire Drums, Tubers, etc.
Special Machinery Built to Order

Akron Standard Mold Co.
Akron, Ohio

CUTTING DIES

Also Tools, Dies, Jigs, Fixtures, Machine Parts and Special Machinery. Now engaged in Prime and Subcontract Work, Defense and Civilian.

Independent Die & Supply Co.,
LaSalle & Ohio Sts. St. Louis 4, Mo.

EXTRUDERS

The pioneer line of tubers, strainers and wire insulating machines. For latest developments inquire of

JOHN ROYLE & SONS
Paterson 3 New Jersey

MACHINERY

L. ALBERT & SON

Trenton, N. J. Stoughton, Mass.

Los Angeles, Calif. Akron, O.

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Machinery and Equipment {continued}

MACHINERY
A complete service from the design of machinery to finished products of all kinds. Equipment for Plantations — also Reclaim, Latex and Rubber Plants.
Layouts — Formulas — Processes
Continental Machinery Company
305 BROADWAY, NEW YORK 7, N. Y.

MACHINERY
A Comprehensive Line of Rubber and Plastic Equipment Including: Mills, Hydraulic Presses, Tubers, Extruders, Strainers, Washers, Crackers, Calenders and Refiners.
Erie Engine & Mfg. Co.
953 East 12th St. Erie, Pa.

MAGNETIC EQUIPMENT | **of All Kinds**
Separators, Clutches, Rolls | Drums, Brakes, Special Magnets
Stearns Magnetic Mfg. Co.
640 So. 28th St., Milwaukee, Wis.

MANDRELS—All Types
Circular and Straight—Aluminum and Steel Licensed Under Clyde E. Lowe Co. Patents
Sherardizing and Chrome Plating Machinery—Air Bag & Mandrel Polishing
National Sherardizing & Machine Co.
Hartford, Conn. Akron, Ohio

MOLDS
For tires, rubber specialties and mechanical goods; general machine work.
The Akron Equipment Co.
Akron, Ohio

Processing Equipment
For Reclaiming Rubber
Attrition Mills; Conveyors; Crushers; Cutters; Elevators; "Frigidisc" Grinders; Hammer Mills; Mixers, Sifters, etc.
MERCER-ROBINSON CO., INC.
30 Church St., New York 7, N. Y.

RUBBER STRIP CUTTER
Strips slab rubber up to 1" thick, 20,000 feet in 8 hours. Any width. Tolerance 1/64 to 1/100 inch. No rejects. Write for full details.
Simplex Cloth Cutting Mach. Co.
270 W. 39th St., New York 18, N. Y.

SPECIAL MACHINERY
For Quality and Efficiency in Working Rubber. Consult us about your problems.
Utility Manufacturing Co.
Cudahy, Wisconsin

STOCK SHELLS
A Type for Every Need—Large Diameter—Light Weight — Extra Strong — Seamless.
National Sherardizing & Machine Co.
Hartford, Conn. Akron, Ohio

TESTING MACHINES
RUBBER TENSILE TEST MACHINES
TEXTILE TESTING MACHINES
Write for Descriptive Literature
Henry L. Scott Co.
P. O. Box 963 Providence, R. I.

USED MACHINERY
For Rubber & Allied Industries
Mills, Calenders, Hydraulic Presses, Tubers, Vulcanizers, Mixers, etc.
Eric Bonwitt
87 So. High St., Akron, Ohio

Rubber—Crude; Scrap; Latex; Dispersions

CRUDE RUBBER
BALATA—SYNTHETIC CHICLE
We handle Manufacturers' Crude Rubber and Balata Purchase Permits.
Charles F. Connor & Co., Inc.
110 State St. Boston, Mass.
Telephone: LAFayette 1202

CRUDE RUBBER
SCRAP RUBBER
Also HARD RUBBER DUST
H. Muehlstein & Co., Inc.,
122 E. 42nd St., New York City
BRANCHES: Akron, Chicago, Boston, Los Angeles, Memphis, London.

CRUDE RUBBER
SCRAP RUBBER
HARD RUBBER DUST
BALATA — GUTTA PERCHA
Hermann Weber & Company
76 Beaver St. New York

DISPERSITE*
Water Dispersed Rubber and Resins
Dispersions Process, Inc.
Under Management of
United States Rubber Company
1230 Sixth Ave., New York 20, N. Y.
Offices in Boston and Detroit
* *Registered U. S. Pat. Off.*

GUAYULE RUBBER
AMPAR BRAND
Washed and Dried
Continental-Mexican Rubber Co.
Incorporated
745 Fifth Ave., New York 22, N. Y.
Formerly Distributed By
Continental Rubber Co., of N. Y.

LATEX
Normal, Concentrated, Processed
HEVEATEX CORPORATION
78 Goodyear Ave. Melrose, Mass.
Offices in New York, Akron, Chicago

LATEX
COMPOUNDED OR UNCOMPOUNDED
NAUGATUCK CHEMICAL
Division of United States Rubber Company
1230 Sixth Ave., New York 20, N. Y.
Offices in Boston and Detroit

LOTOL*
(Compounded Latex)
Ready to use
NAUGATUCK CHEMICAL
Division of United States Rubber Company
Rockefeller Center, New York 20, N. Y.
Offices in Boston and Detroit
Reg. U. S. Pat. Off.

REVERTEX
Highly Concentrated (About 75%)
Rubber Latex
Sole Distributor for U. S. A. and Canada
Revertex Corp. of America
37-08 Northern Blv'd., L. I. City 1, N. Y.

RUBBER
Crude Rubber
Liquid Latex
Ernest Jacoby & Co.
79 Milk St. Boston, Mass.
Cable Address: Jacobite Boston

The Market Place

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Rubber [Cont'd]

RUBBER and PLASTICS SCRAP

ROTEX RUBBER CO., INC.
437 Riverside Ave., Newark, N. J.

RUBBER— Scrap and Crude
Also HARD RUBBER DUST
A. SCHULMAN, INC.
790 E. Tallmadge Ave., Akron 9, Ohio
14th & Converse Sts., E. St. Louis, Ill.
738 Statler Bldg., Boston 16, Mass.
500 Fifth Ave., New York 18, N. Y.
509 Mill St., Conneaut, Ohio
Warehouses: Akron, E. St. Louis, Boston.

VULTEX— THE ONLY VULCANIZED LATEX
Insures Highest Quality, Uniformity, Economy, Simplicity of Application.
FULLY PROTECTED BY PATENTS
Also Latex and Latex Compounds
General Latex & Chemical Corp.
Successors to the Vultex Chemical Company
666 Main St. Cambridge, Mass.

Reclaimed Rubber . . . .

NERVASTRAL RECLAIMING PROCESSES
HIGH GRADE — HIGH SPEED
HIGH ECONOMY
Rubber & Plastics Compounds Co., Inc.
30 Rockefeller Plaza, New York 20, N. Y.
Tel: COlumbus 5-0085

RECLAIMED RUBBER—
For All Purposes
NAUGATUCK CHEMICAL
Division of United States Rubber Co.
1230 Sixth Ave., N. Y. 20, N. Y.

RECLAIMED RUBBER—
Uniformity, reliability, cleanliness
PEQUANOC RUBBER CO.
Butler, N. J.

RECLAIMED RUBBER—
A standardized grade for every requirement.
U. S. Rubber Reclaiming Co., Inc.
500 Fifth Ave., New York 18, N. Y.
"61 Years Serving the Industry Solely as Reclaimers"

Rubber—Synthetic

HYCAR
For extreme resistance to heat, abrasion, oil, gasoline, aging, and deterioration.
HYCAR CHEMICAL COMPANY
335 South Main St.
Akron Ohio

NEOPRENE
The Versatile Synthetic Rubber
Different types
to meet special requirements
E. I. du Pont de Nemours & Co., Inc.
Rubber Chemicals Div.
Wilmington 98, Delaware

PERBUNAN
Oil Resistance—Heat Resistance
Long Life
Full information upon request.
STANCO DISTRIBUTORS, INC.
26 Broadway New York 4, N. Y.

THIOKOL
Synthetic rubber available in several types, including powder form. Excellent solvent resistance and aging properties.
THIOKOL CORPORATION
Trenton N. J.

Fabrics

CUSTOM FINISHERS of
RUBBER REPELLENT LINERS
Capitol Process Liner Treatment
Textile Proofers, Inc.
181-183 Culver Avenue
Jersey City 5, N. J.

FABRICS
A complete line of Chafers, Drills and Twills, Ducks, Hose Yarn and Liner Cloths for the Rubber Industry.
Mt. Vernon-Woodberry Mills, Inc.
Selling Agents
Turner Halsey Company
40 Worth St. New York 13, N. Y.

PROCESSED LINERS
"CLIMCO"—Fabrics treated to prevent adhesion of rubber stocks.
"LINERETTE"—Treated paper for separating or interleaving light weight rubber stocks.
The Cleveland Liner & Mfg. Co.
5508 Maurice Ave., Cleveland, Ohio

Consultants

CHEMISTS-ENGINEERS
Our staff of chemists, engineers and bacteriologists, with laboratories for analysis, research, physical testing and bacteriology are prepared to render you
Every Form of Chemical Service
FOSTER D. SNELL, INC.
312 Washington Street, Brooklyn 1, N. Y.

CHEMIST—IND. ENGINEER
New products evaluated for agents or manufacturers. Compounding and testing pigments in rubber synthetics and thermoplastics. Particle sizing. Supervision industrial research programs in New England technical colleges.
ALAN R. LUKENS
11 Windsor St. Cambridge, Mass.

CONSULTANT ENGINEERING
Product development, research, testing and patent investigations in the fields of rubber, synthetic rubber, and plastics.
WILBURN F. BERNSTEIN
One No. LaSalle St., Chicago 2, Ill.

CONSULTING
Rubber Technologist
Natural and Synthetic Rubber
R. R. Olin Laboratories
P. O. BOX 372, AKRON 9, OHIO
Telephones: HE 3724, FR 8551

CONSULTING TECHNOLOGIST
Research, physical testing, chemical analysis, formulae and product development.
PHILIP TUCKER GIDLEY
FAIRHAVEN MASSACHUSETTS

PLANT ENGINEERING
New Plants, Alterations, Rehabilitation, Modernization, Maintenance and Special Equipment. Plans, Specifications, Investigations and Reports. Complete Engineering for Industry.
JAMES F. MUMPER
412 Everett Bldg., 39 E. Market St.
AKRON 3, OHIO

Rubber Mnfrs.

SANITARY GOODS—
Dress Shields, Baby Pants, Aprons, Elastic Belts, Bloomers, Stopins, Bibs, Crimpo and Brassieres.
SPECIAL GOODS CUT TO ORDER
Rand Rubber Co., Inc.
Summer Ave. & Halsey St., Brooklyn, N.Y.

WANT ADS

RATES: Eight cents per word, minimum charge $3.00, except POSITIONS WANTED, $1.00 for 40 words or less, extra five cents per word. All classified advertisements payable in advance. Address replies to box numbers care of RUBBER AGE, 250 West 57th St., New York 19, N. Y.

POSITIONS WANTED

POSITION WANTED as Plant Superintendent or Production Manager. Experienced in synthetic and rubber compounding, milling, calendering, extruding and molding of tires, tubes and mechanical goods. Know modern production methods and costs. Small plant preferable. Address Box 1542, RUBBER AGE.

CHEMIST, experienced in all phases of compounding, processing and development of tires, tubes and mechanical goods, desires a position offering future opportunities. Age 26, draft deferred. Address Box 1622, RUBBER AGE.

RUBBER CHEMIST AND COMPOUNDER, experienced in factory supervising and processing. Recently returned after several years in Latin America. Would welcome opportunity to assist in essential war work. Thirty-five years' experience in tires and tubes, drug sundries, footwear, heels, soles, miscellaneous press goods, tubing machine products, mechanical goods, reclaimed rubber, etc. Location immaterial. Address Box 1626, RUBBER AGE.

SYNTHETIC RUBBER AND PLASTICS CHEMIST, B.S. and M.S., six years' industrial experience in compounding synthetics. At present in charge of research and development of synthetics for coated fabrics, adhesives, moldings, sheet goods and extrusion. Married, 4F, Salary $5,800. Address Box 1627, RUBBER AGE.

HELP WANTED

TIRE CURING FOREMAN, capable of supervising production in pot heaters and individual vulcanizers. Excellent opportunity for good post war position. Location away from Ohio. Address Box 1588, RUBBER AGE.

TIRE FINISHING SUPERVISOR, familiar with all duties connected with cured tire final finishing department. Good opening in progressive organization. Location in Pennsylvania. Address Box 1589, RUBBER AGE.

TUBE ROOM SUPERINTENDENT, must be thoroughly familiar with tube room operations. Salary commensurate with ability. All replies treated in strictest confidence. Address Box 1590, RUBBER AGE.

SUPERINTENDENT for rubber plant in Northern Ohio employing 150 people. Must have general experience with mechanical rubber products. Position offers excellent opportunity for the right man. Address Box 1601, RUBBER AGE.

TIRE AND TUBE DEVELOPMENT AND CONSTRUCTION ENGINEERS. Opening in progressive Eastern concern for man with experience and capability. Definite opportunity for advancement in post-war era. Reply all details first letter. Address Box 1613, RUBBER AGE.

CHEMIST. Must have thorough knowledge of tire, tube or mechanical goods manufacture. Plant located in Pennsylvania. Excellent opportunity. All replies strictly confidential. Address Box 1614, RUBBER AGE.

MECHANICAL ENGINEER WANTED

Mechanical Engineer thoroughly experienced in the designing and operation of mills, calenders, etc. for the rubber and plastic industry. Must have technical training and good references. Will be required to do layout work and develop new equipment. The plant needing the services of this engineer is long established and a recognized leader in the manufacture of rubber and plastic working machinery. The position is permanent and offers exceptional post war opportunities to the right man.

Address **Box 1602**

RUBBER AGE, 250 West 57th St., New York 19, N. Y.

HELP WANTED (Continued)

GENERAL FOREMEN, experienced in all phases of molded rubber goods, wanted by progressive West Coast Firm. Address Box 1624, RUBBER AGE.

CHEMIST for routine and development work. Experience in rubber and synthetics. By old successful Chicago Factory; good opportunity for advancement. Salary commensurate with ability. Address Box 1625, RUBBER AGE.

CHEMIST OR CHEMICAL ENGINEER for laboratory to do formulating of coatings and adhesives. New York location. Address Box 1617, RUBBER AGE.

CHEMIST, experienced in mechanical rubber goods, compounding and testing. Location New York state. Write giving full particulars and salary desired. Address Box 1618, RUBBER AGE.

CHEMIST for laboratory and factory development work on soles, heels and mechanicals. Some plastic experience desirable but not necessary. New England location. Address Box 1621, RUBBER AGE.

RUBBER COMPOUNDER AND ENGINEER with 3-7 years of experience, preferably on hose or belts, wanted by rubber manufacturer located in Eastern Pennsylvania. Please give full details as to experience, qualifications, salary desired, etc., in first letter. Statement of Availability is necessary. Address Box 1623, RUBBER AGE.

RESEARCH CHEMIST, with experience in mechanical and molded goods, wanted by progressive manufacturer located in New York area. All replies treated with strict confidence. Give full background and advise salary expected. Address Box 1636, RUBBER AGE.

RUBBER CHEMIST, permanent; mill room and compounding experience, particularly synthetics; excellent prospects for advancement. Write for interview giving pertinent details. Address Box 1628, RUBBER AGE.

CHEMIST, familiar with shoe manufacture, particularly cements and machines, to take charge of development of shoe adhesives, including customer contact, adhesive research, production methods and control systems. One capable of carrying responsibility in a firm well established and known in the shoe adhesive industry. Location near Boston. Address Box 1629, RUBBER AGE.

CHEMIST: Experienced in all phases of compounding molded rubber goods and sponge rubber products, using both natural and synthetic rubber. Excellent opportunity for advancement with small progressive company located in Mid-West. Address Box 1630, RUBBER AGE.

RUBBER CHEMIST. College graduate in Chemistry or Chemical Engineering with compounding experience desired for laboratory research and development work on compounding and evaluation of synthetic rubbers by large oil company located in New York area. In reply give age, education, experience, and salary expected. Our own employees have been informed of the appearance of this advertisement. Address Box 1632, RUBBER AGE.

WANTED

A technically trained man with good background in Mixing, Calendering, and Tubing, to work in the newly created Technical Department of a plant producing mechanical rubber goods. Factory located in Western New York State. Good post-war future. Address Box 1603, RUBBER AGE.

MILL AND CALENDER FOREMAN

for medium-sized rubber factory in small town near Boston making wide variety of rubber products. Excellent post-war prospects.

Address Box 1619, RUBBER AGE.

MISCELLANEOUS

NOTICE

I have resigned my position as General Manager of the Associated Rubber Products Company, Quakertown, Pennsylvania, effective November 30, 1944. A. R. BERMAN, 36 South Main Street, Quakertown, Pennsylvania.

BUSINESS OPPORTUNITIES

WANTED: Small rubber plant with mills and calenders. Presses not necessary. Will lease or buy outright. Address Box 1620, RUBBER AGE.

ARE YOU CALLING ON RUBBER AND PLASTIC MOLDERS? If so, increase your income selling them a steam fitting all of them use. Address Box 1633, RUBBER AGE.

EQUIPMENT WANTED

WANTED—Herringbone Gear Reduction unit of 150 H.P. Ratio of approximately 7 to 1, also Herringbone Gear Reduction unit, 100 H.P. Ratio of approximately 7 to 1, by manufacturer in Boston area. Address Box 1599, RUBBER AGE.

WANTED: By manufacturer, a base or Bedplate for No. 9 Banbury, also interested in purchasing a complete used in good condition No. 9 or 11 Banbury. Address Box 1600, RUBBER AGE.

WANTED—Production Refiners. Line of 2, or 2 singles. Send details to SCHACHT RUBBER MFG. COMPANY, Huntington, Indiana.

WANTED—Hydraulic Presses with pump and accumulator. Banbury Mixer, Mills, Calender, Tubers, any condition. Address Box 1631, RUBBER AGE.

WANTED: 36-inch Rubber Mill, with or without drive and motor. Also a No. 2 Tuber. Should be in fair condition. Address Box 1635, RUBBER AGE.

EQUIPMENT FOR SALE

FOR SALE: Eight molds—17½" x 17½"—for Grommets—81 cavity each. Sizes: 3/16", 1/2", 7/16", 11/16", 3/4", 13/16", 15/16" and 5/16", and two top plates to fit the above molds. E. J. MCCORMICK RUBBER COMPANY, INC., 62 Bergen Turnpike, Ridgefield Park, New Jersey.

FOR SALE: Air compressors, steam driven. 2550 cu. ft. Ingersoll-Rand, 100-lb. air, 2375 cu. ft. Worthington, 100-lb. air, and 450 cu. ft. High Pressure Worthington, 3500-lb. air. All compressors for 125-lb. steam pressure. Immediate delivery. F. H. CRAWFORD & COMPANY, INC., 30 Church Street, New York 7, N. Y.

"V" BELT MACHINERY
COMPLETE BELT MAKING EQUIPMENT

Belting machines, cutters, slitters, wrappers, measuring machines, trimmers, expanding mandrels, cord latexers and driers. HOWE MACHINERY COMPANY, INC., 30 Gregory Avenue, Passaic, New Jersey.

FOR SALE: 1—Royle No. 4 Perfection Tuber, M.D.; 1—Weighted Accumulator, 2000#; 2—Dunning and Boschert 24" x 24" Hydraulic Presses with 12" diameter rams; 1—18" x 18" Hydraulic Press with 10" diameter ram; 3—30" x 24" Hydraulic Presses with 12" diameter rams; 1—24" x 24" Hydraulic Press with 14" diameter ram; 4—W. & P. Mixers, up to 625 gallon capacity; 1—Allen No. 3 Tuber; 10—High Pressure Hydraulic Pumps, up to 6000 GPM.; Dry Mixers, Grinders, Pulverizers, etc. Send for complete list. CONSOLIDATED PRODUCTS COMPANY, INC., 14-19 Park Row, New York 7, N. Y.

FOR SALE: Hydraulic Presses: 600 ton Watson-Stillman 24" x 24"; 1—36" x 36", 12" ram; 4—2 post 20" x 20", 8" rams; 1—52" x 26", 14" ram; 3—12" x 12", 7½" rams; 1—20" x 20", 14" ram; 2—30" x 52", 1 with 15" ram, 4 openings, 1 with 6" ram, 3 openings; 1—26" x 45", 10" ram; 1—38" dia., 12" ram pump attached; 1—14" x 20" Combination Hydraulic Toggle. Pumps: 1—Watson-Stillman duplex high and low pressure ¾ GPM, 4000 lbs. continuous bedplate; Hele Shaw JLP 12, 44 GPM, 1200 lbs.; HPM Triplex 1¾ GPM, 2000 lbs. on high, 16 GPM, 400 lbs. on low, V Belt drive; Robertson Triplex 5 GPM, 5000 lbs.; Union Steam Pump Viscolizer, 5 GPM, 2500 lbs.; 2 Hauser, 4 plunger, 4.6 GPM, 5000 lbs. on high, 20 GPM, 500 lbs. on low; Gould Triplex 35 GPM, 1500 lbs.; 1—National 1" x 3" Triplex, 4000 lbs., 3 GPM. Accumulators: Hydro-pneumatic Watson-Stillman 9 GPS, 6000 lbs.; weighted type, 1—5" dia., 6' stroke ram; 1—8" dia., 6' stroke ram. Extruders, Mills, Calenders, Mixers, etc. Advise your requirements. Highest Prices Paid for Your Used Equipment. UNIVERSAL HYDRAULIC MACHINERY COMPANY, 285 Hudson Street, New York 13, N. Y.

NEW & REBUILT MACHINERY

Equipped to Furnish Complete Plants

L. ALBERT & SON

OFFICES AND PLANTS

TRENTON, N. J. • AKRON, OHIO

LOS ANGELES, CALIF. • STOUGHTON, MASS.

Our Rebuilding Process Removes the Element of Risk by These Five Important Steps:

1. INSPECTED
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3. REBUILT
4. MODERNIZED
5. GUARANTEED

Our New Machines:
MILLS
MIXERS
BRAKES
PRESSES
CUTTERS
SUSAN GRINDERS

Rubber Machinery WANTED

Banbury Mixer, 3A
Three-Roll Calender, 16" x 48"
Four-Roll Calender, 12" x 24"
Four-Opening Press, 24" x 24"
with pump unit.

All machines with drive and motor to be in good working condition.

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INDEX TO ADVERTISERS

Advance Solvents & Chemical Corp. 334
Akron Equipment Co. 336
Akron Standard Mold Co. 335
Albert & Son, L. 339, 335
Aluminum Flake Co. 333
American Cyanamid & Chemical Corp. 266, 333
American Resinous Chemicals Corp. 321
American Zinc Sales Co. 335
Atlas Electric Devices Co. 320
Automatic Sprinkler Corp. of America 319

Baker Castor Oil Company 243
Baker Chemical Co., J. T. 234, 334
Barber Asphalt Corp. 328
Barrett Div., Allied Chemical & Dye Corp. 252, 334
Beacon Co. 273, 323, 335
Bernstein, Wilburn F. 337
Binney & Smith Co. ..... Insert Following 298; 333, 334, 335
Black Rock Mfg. Co. 335
Bonwit, Eric 329, 336
Brockton Cutting Die & Machine Co. 329, 335
Bunatak Chemical Co. ..... ——

Carbide & Carbon Chemicals Corp. ..... ——
Carey, Philip, Mfg. Co. 329, 334
Carter Bell Manufacturing Co., The 272, 334
CLASSIFIED ADVERTISING 338, 339
Cleveland Liner & Mnfg. Co. ..... Back Cover, 337
Colonial Insulator Co. 335
Columbian Carbon Co. ..... Insert Following 298
Concord Mica Corp. 334
Connor, Charles F., & Co., Inc. 336
Continental Carbon Co. 270, 333
Continental Machinery Co. 325, 336
Continental-Mexican Rubber Co. 339, 336

Dispersions Process, Inc. 265, 336
Du Pont de Nemours & Co., E. I. ..... Inside Front Cover; 334, 337

Erie Engine & Mnfg. Co. 257, 336
Executone, Inc. 321

Farrel-Birmingham Co., Inc. 238, 239

Gammeter, W. F., Co. 329, 335
General Atlas Carbon 262, 334
General Chemical Co. 253
General Latex & Chemical Corp. 246, 337
General Magnesite & Magnesia Co. 272, 334
Gidley, Philip Tucker 337
Goodrich, B. F., Co., Chemical Div. 233

Hall Co., The C. P. 245, 333, 334
Herron Bros. & Meyer 240, 262, 334
Hevea tex Corporation 333, 336
Heyden Chemical Co. ..... ——
Huber, J. M., Inc. 333
Hycar Chemical Co. 231, 337

Independent Die & Supply Co. 326, 335
Industrial Oven Engineering Co. 256
Interstate Welding Service 335
Jacoby, Ernest, & Co. 333, 336
Johnson & Co., Chas. Eneu 333

Koppers Company 333

Loewenthal Company 250
Lukens, Alan R. 337

Magnetic Gauge Co. 318
Malrex Chemical Co. ..... ——
Marbon Corp. 324
Mercer-Robinson Company, Inc. 326, 336
Meyer & Brown, Inc. ..... ——
Meyercord Company ..... ——
Monsanto Chemical Co. 263, 333, 334
Moore & Munger 258, 333
Mt. Vernon Woodberry Mills, Inc. 337

Muehlstein & Co., H., Inc. 268, 336
Mumper, James F. 337

National Lead Co. 236
National Rosin Oil & Size Co. 329, 334
National Sherardizing and Machine Co. 329, 336
National-Standard Co. 242
Naugatuck Chem. Div., U. S. Rubber Co. 276, 265, 333, 336, 337
Neville Co. 255, 338
New Jersey Zinc Co. 244, 335
New Wrinkle, Inc. ..... ——

Olin Laboratories, The R. R. 337

Pancorbo, M. 335
Pennsylvania Industrial Chemical Corp. 241, 333
Pequanoc Rubber Co. 337
Phillips Petroleum Co. 232, 334
Pittsburgh Plate Glass Co., Columbia Chemical Div. 261, 333
Polymel Corp. ..... ——
Precision Scientific Co. 251
Procter & Gamble 334
Proctor & Schwartz, Inc. 267, 335
%Proportioneers, Inc.% 259

Rand Rubber Co. 337
Randall, Frank E. 335
Rare Metal Products Co. 329, 333
Rayon Processing Co. of R. I., Inc. 327
Revertex Corp. of America 336
Rotex Rubber Co., Inc. 337
Royle & Sons, John 274, 335
Rubba, Inc. 327
Rubber & Plastics Compounds Co., Inc. 337

St. Joseph Lead Co. 335
A. Schrader's Son 271
Schulman, A., Inc. ..... Inside Back Cover; 337
Scott Co., Henry L. 329, 336
Sharples Chemicals, Inc. ..... ——
Shell Oil Co., Inc. 237, 334
Simplex Cloth Cutting Machine Co., Inc. 325, 336
Skelly Oil Co., Solvents Div. 335
Snell, Foster D., Inc. 337
Spadone Machine Co. 323
Stamford Rubber Supply Co. 340, 334
Stanco Distributors, Inc. 260, 337
Standard Chemical Co. 249, 333
Stauffer Chemical Co. 325, 335
Stearns Magnetic Mfg. Co. 329, 336
Sun Oil Co. 334

Taber Instrument Corp. ..... ——
Tanney-Costello Co. 324
Textile Proofers, Inc. 322, 337
Thiokol Corp. 337
Thropp & Sons, William R. ..... ——
Titanium Pigment Corp. 335
Turner Halsey Company 337

Union Bay State Co. 254
Union Carbide & Carbon Corp. ..... ——
United Carbon Co. ..... Insert Following 246; 333
United Engineers & Foundry Co. ..... ——
United Shoe Machinery Corp. 336
U. S. Rubber Reclaiming Co. 331, 337
U. S. Stoneware Co. 328
Utility Mfg. Co. 336

Vanderbilt, R. T., Co. ..... Front Cover; 334

Waldron Corp., John 327
Weber, Hermann & Co. 336
Whittaker, Clark & Daniels, Inc. 323, 333
Williams, C. K., & Co. 339, 334
Wilmington Chemical Corp. 235, 335
Witco Chemical Company 269, 333

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